MARCH 21, 1960

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

Capital Equipment Spending Bounces Back Toward Record $37 Billion

U. S. Steel Attacks Wage Inflation

Conveyor Makers Pin Hopes for Sales Revival on New Upturn in Inquiries

The ABCs of Explosive Forming

Flow Design Concept Gives Castings More Jobs in Heavy Equipment

Construction Gets Off to Fast Start

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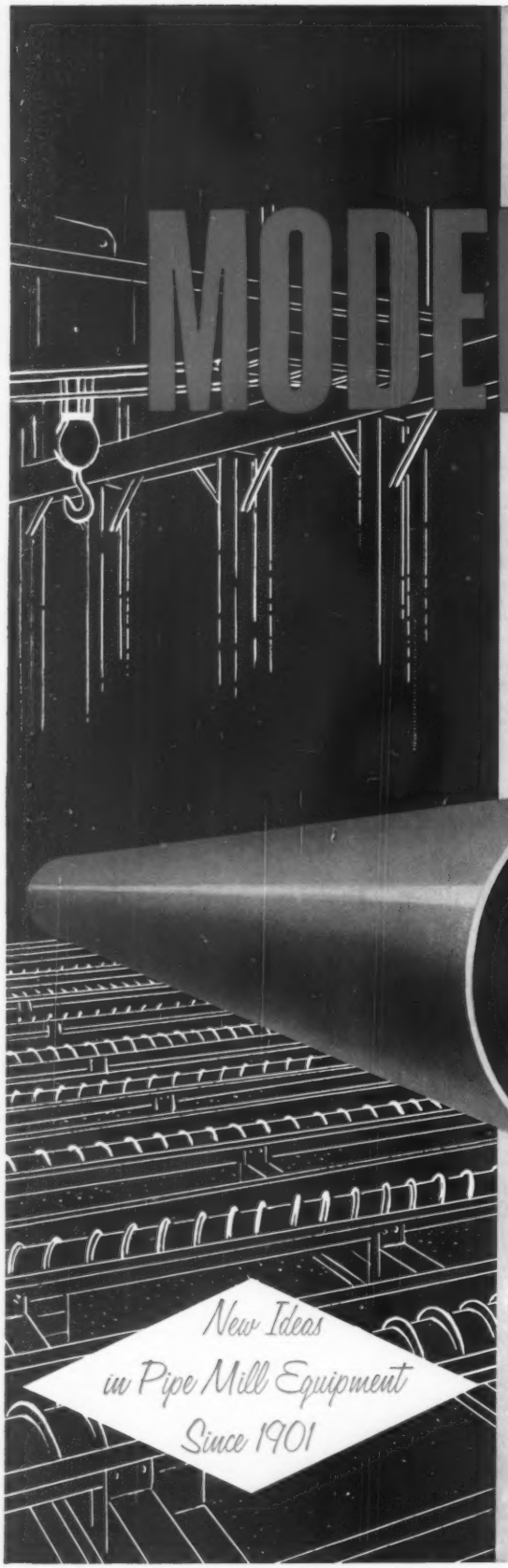

Pipe mills, too, need MODERNIZING

We are doing a lot of work these days on modernizing Continuous Butt Weld Pipe Mills and Seamless Tube Mills.

The continued and projected demand for pipe and tubes makes modernization of mills a must to maintain a competitive position in the business.

Individual items of the mills can be revamped. Existing mills can be rebuilt. Mills can be moved from one location to another.

As the "pipe mill people", we are constantly developing new ideas for new mills and existing mills. These ideas center on two main points: (1) to increase production and (2) to improve the quality of the pipe or tube.

We would like to talk to you about these new ideas and show you how your mills can be made more profitable. Write to Aetna-Standard Division, Blaw-Knox Company, Pittsburgh 30, Pennsylvania.

Aetna-Standard Division

BLAW-KNOX

This Week in STEEL
The Metalworking Weekly

March 21, 1960 Vol. 146 No. 12

Capital Spending Higher in '60

Industry will be shopping for $37 billion worth of plant and equipment this year. That's the forecast of government economists who have just surveyed industry's plans for capital expenditures throughout the year. Outlays of $37 billion this year will be 14 per cent above last year's; spending should top the previous high in 1957. Appropriations by all manufacturers will climb 25 per cent over last year's, while spending by durable goods producers mounts 33 per cent. PAGE 93

U. S. Steel Attacks Wage Inflation

"This nation cannot prudently accept endless employment cost increases that outstrip increases in national productivity." The consequences, says U. S. Steel Corp., are spiraling prices, multiplying money supplies and declining confidence in the dollar. PAGE 97

Conveyor Makers See Sales Upturn in Inquiries

Conveyor makers expect sales to rise about 15 per cent this year, in line with expectations for over-all plant and equipment expenditures. Prices also could rise—as much as 5 per cent. Producers, however, think that the increased volume of business may help offset rising labor and material costs; tougher competition will hold them to moderate increases. PAGE 95

The ABCs of Explosive Forming

Now hear this: Navy experts at the Naval Ordnance Test Station, China Lake, Calif., can give you the lowdown on explosive metalworking. If you're considering an application for the technique, see PAGE 140

Flow Design Concept Gives Castings More Jobs

Flow designed castings may offer new opportunities for founders and cost savings to customers. They're used extensively in a new line of crawler tractors developed by Eimco Corp., Salt Lake City, Utah. Castings are designed with extra "beef" only where it is needed. Sections where loading is light are reduced; stresses flow evenly throughout individual components. One piece cast construction of major components saves maintenance dollars by eliminating many bolts and welds. PAGE 156

Construction Gets Off to Fast Start

Builders say construction expenditures in 1960 may hit a record $75.5 billion. Industrial construction is scheduled to rise 34 per cent to $4 billion. Commercial building is expected to go up 15 per cent to $2.5 billion; housing may drop 17 per cent. PAGE 207

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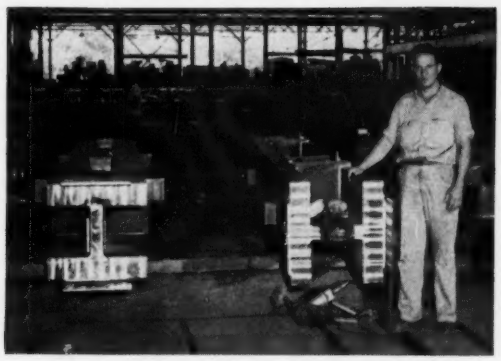


These built-up columns of Bethlehem plate were welded and fabricated in the Houston plant of Mosher Steel Company.

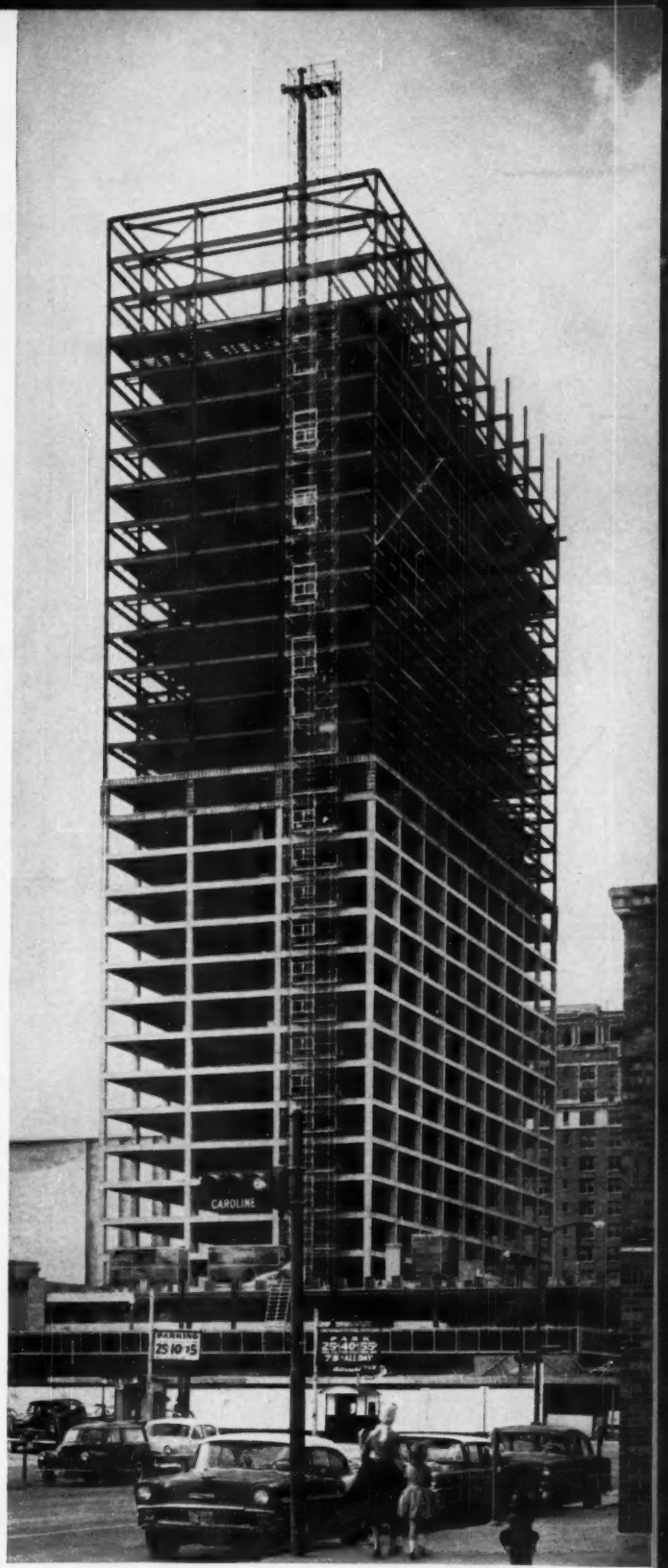
Built-up steel plate columns weigh 1200 lb per ft

Columns of built-up steel plate are an interesting feature of the new 31-story First City National Bank Building in Houston, Texas. Ranging in weight from 500 lb per ft to giants of 1200 lb per ft, the columns were made from Bethlehem plates, some as thick as six inches. Entirely shop and field welded, the columns and beams were erected without riveting or bolting.

The uniform quality of Bethlehem plates makes them ideal for weldments of any type. Coupled with good welding technique, the use of Bethlehem plates assures sound welds. Bethlehem plates are available in a full range of sheared and universal mill sizes. For full details, call the nearest Bethlehem sales office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

Field erection was all-welded. Architects for First City National Bank Building: Skidmore, Owings and Merrill.
Associate architects: Wilson, Morris, Crane & Anderson.
Structural engineer: Robert J. Cummins.
General contractor: W. S. Bellows Construction Co.; steel erectors: Peterson Brothers



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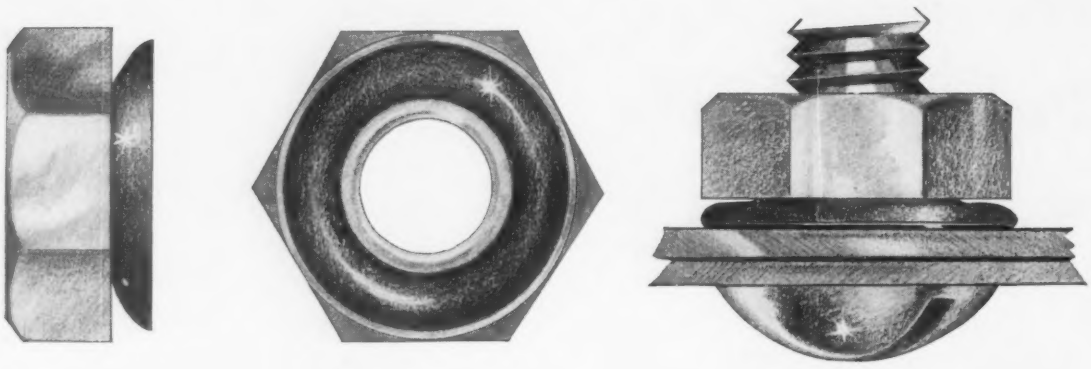
NEW TENZ-NUT®



preassembled for fast production . . .

Now — a spring washer preassembled on a hex nut — to save time in all types of assembly operations where the tested principle of bolt, nut and spring washer are required. Developed by Eaton-Reliance, this new fastener is now available for production use.

The spring washer — a modified Belleville, or "cupped" type — is firmly attached to the hex nut, yet it spins freely during application and removal. Tenz-Nuts are reusable.

The proven locking principle of the cupped-type washer, when combined with a hex nut, gives you a versatile fastener for automatic assembly operations. It is particularly applicable where finished parts are being assembled and it is desirable to minimize surface marring. Tenz-Nuts may also be adapted as sealing nuts.

Write for our new Engineering Bulletin which fully describes Tenz-Nuts.

Eaton also offers a complete line of Keps®— hex nuts preassembled with tooth-type washers. Our fastener engineers will gladly consult with you on possible applications on request.

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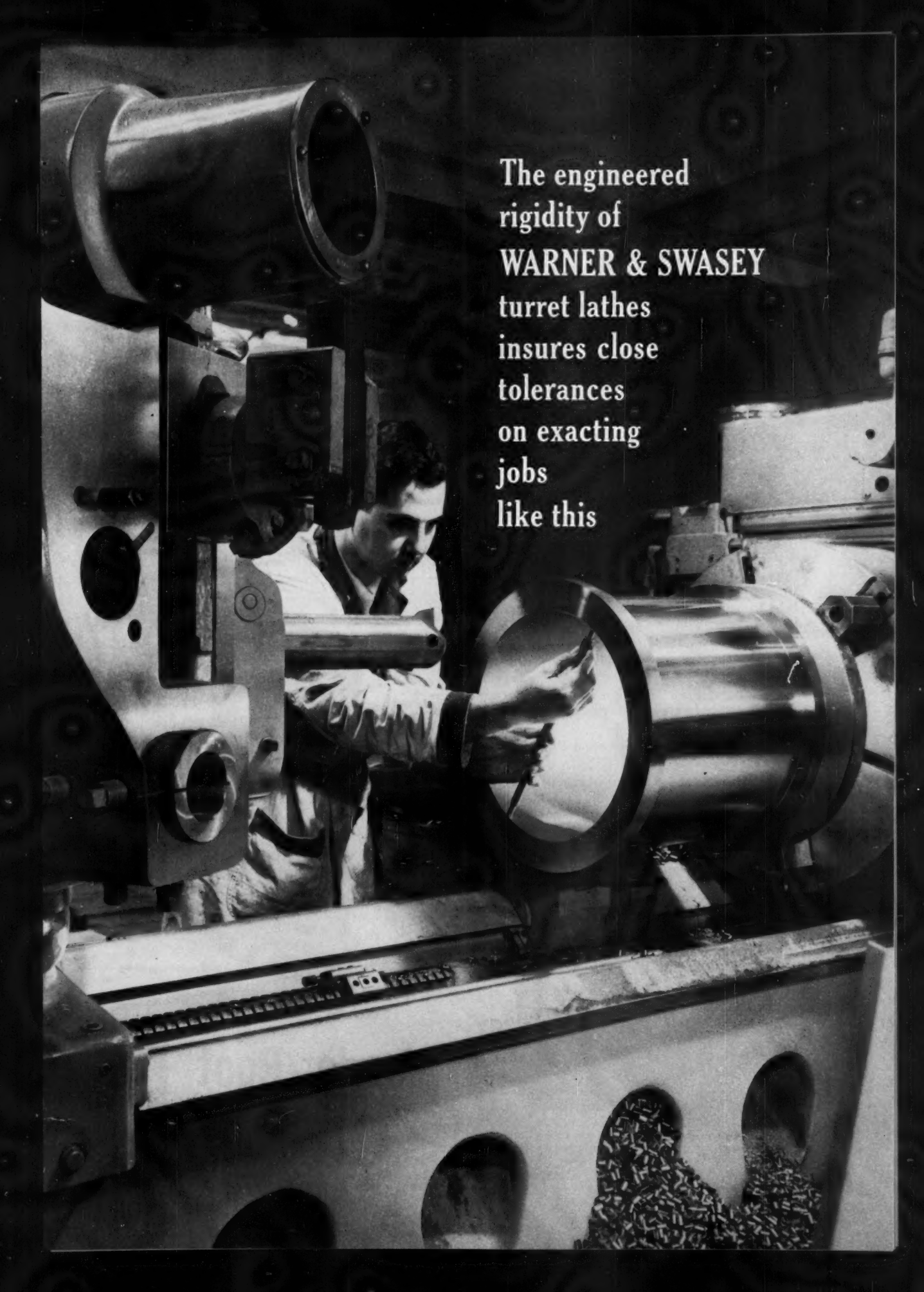
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rigidity of
WARNER & SWASEY
turret lathes
insures close
tolerances
on exacting
jobs
like this

Veeder-Root Countrol...

...practical, low-cost method to cut costs, improve efficiency

There are five important areas in plant operation where Veeder-Root counters can effectively (and inexpensively) help to control costs and allow maximum utilization of inventory and equipment.

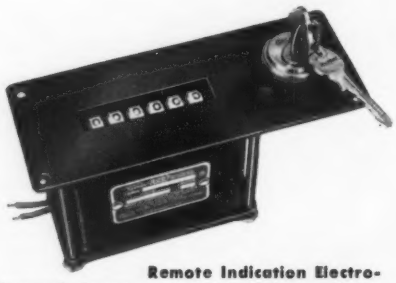
- A counting and tallying program keeps constant track of inventory movement, provides regular checks, "signals" danger spots.
- Counting devices provide a continuous record of production, can be located at individual machines and remoted to centralized control points.
- Counters make it easy to compute and pay by piece or other production unit.
- Cost estimate and cost control can be carefully watched with counters. Machine utilization can be increased.
- Predetermining Counters can actually control machine output and processes, prevent overruns or shortages.

Veeder-Root Counters are easy to apply, can count anything that moves. Ask for complete details from your Industrial Distributor, or application assistance is available from a Veeder-Root Counting Engineer. Call or write, today.

Vary-Tally — low-cost, mechanical tally for more accurate counting of units, parts, inspection results and the like. Single units, strips, tiers, or any combination.

Count-Pak — a line of electronic counters for fast, accurate counting of all types and shapes of objects at medium to high speeds.

Visicounter — a rugged, heavy-duty all-purpose mechanical counter with high figure visibility.



Remote Indication Electro-Magnetic Counters — used to display production information at centralized or remote locations.

Predetermining Counters — provide low-cost, simplified "automation" by precontrolling production runs to exact figure. Will actuate lights, bells, relays, stop motions.

Veeder-Root

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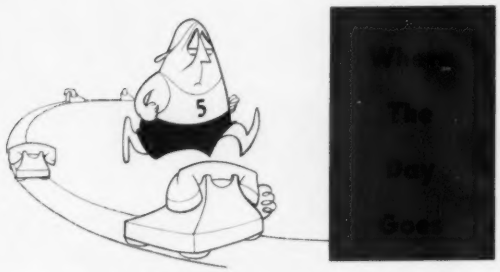

Those valuable business instruments, telephones, are dialed an average of about 265 million times per day in the U. S. In its book *The Embattled Executive,* the American Management Association views the lighter side of executive problems and says this: "Round and round the track, pausing every few steps for an incoming (and probably unnecessary) phone call. If they'd only take out the phones, you could probably run a 3 minute mile."

If you feel as if every one of those 265 million calls were directed your way, read about. . .

Other Executive Hurdles

New York Resident Editor Brian Wilson has been interviewing management consultants, organization officials, and executives to find out how subordinates can increase their bosses' productivity. He's also unearthed a wealth of material on what top management and individuals can do to increase their work output.

He found companies offering courses in reading skills, and, in general, anything that elevates managerial efficiency.

Identification of factors that sap productivity can be rugged. To detect them, one metalworking company president had a buzzer sounded in his office every 15 minutes. At the signal, he jotted down his task of the moment. After three weeks, a consultant's appraisal disclosed that the man spent too much time on jobs that should have been delegated. You can read about those and other techniques in next week's issue.

We Must Be Vigilant Dept.

A memo from Sackett Mfg. Co., Fredonia, N. Y., asks: "We would like more information on the air impact tool that the poor mechanic is twisting for all he's worth on Page 70 in the Feb. 22 article, 'Hand Tool Costs Too High?' Also the standard socket wrench with the spinner handle shown on Page 71. Looks like your printer doesn't know a wrench from an air hammer." **Editor's Note:** He does now—the captions were switched.

Cultivating the Coin

What's better than a money tree? STEEL's Usership Idea contest. If we may be permitted a horticultural analogy, it's nonseasonal, blooms every month, bears fruit within two months, and will repeat its yield within six months if cultivated carefully. Read on, maybe you can harvest $1000.

The Seeds of Ideas . . .

. . . are found in each issue of STEEL. Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—March, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—**you will win $500.**

There's more . . . you will win an additional $500 if you furnish written proof that you were successful in accomplishing your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

Entries will be judged by a committee of STEEL editors. All letters become the property of STEEL Magazine.

You can enter as many times as you wish. Once again, we urge you to be specific —give figures, examples, and illustrations to add to clarification of your entry. **Deadline for the March contest is May 1, 1960.** Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio.

More on Penton's Census

Though our census was seven years old at the time, The Penton Publishing Co. adopted the Standard Industrial Classification coding system when it was instituted by the U. S. Bureau of the Budget in 1945. (Refinements came in 1957.) Under the S.I.C. system, all business activities are assigned numbers. Our census cards list each company according to major product by four digit S.I.C. numbers, as well as by average employment, address, metalworking operations performed, and the sources of our verification information.

If our editors want to consult metal stamping firms, they turn to S.I.C. 3461 and find 792 cor-

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porate officials and general managers listed. Similarly, they can reach makers of locomotives, umbrellas, buttons, or blast furnaces.

The Penton census covers nine of the 21 manufacturing categories in S.I.C. and represents all metalworking plants with 20 or more employees. The nine: Ordnance and accessories; furniture and fixtures; primary metal industries; fabricated

A card punch operator encodes census cards

metal products; machinery; electrical machinery, equipment, and supplies; transportation equipment; professional, scientific, and controlling instruments; and miscellaneous manufacturing industries in metalworking.

"All information we obtain is held absolutely confidential," says Jack Gernhard, director of Penton's census and STEEL's circulation director. "We do not sell lists of names to direct mail houses or subscription services." Jack's staff of 15 people is charged with caring for what is the largest census of metalworking—an operation valued in the millions of dollars.

That's about the story of our census. As Dale Carnegie advises: "Know your audience and speak in terms of its interests." The census enables our editors to know you, the 47,742 qualified recipients of STEEL (and some 185,000 readers) in the 30,000 or so plants that constitute the world's largest industry.

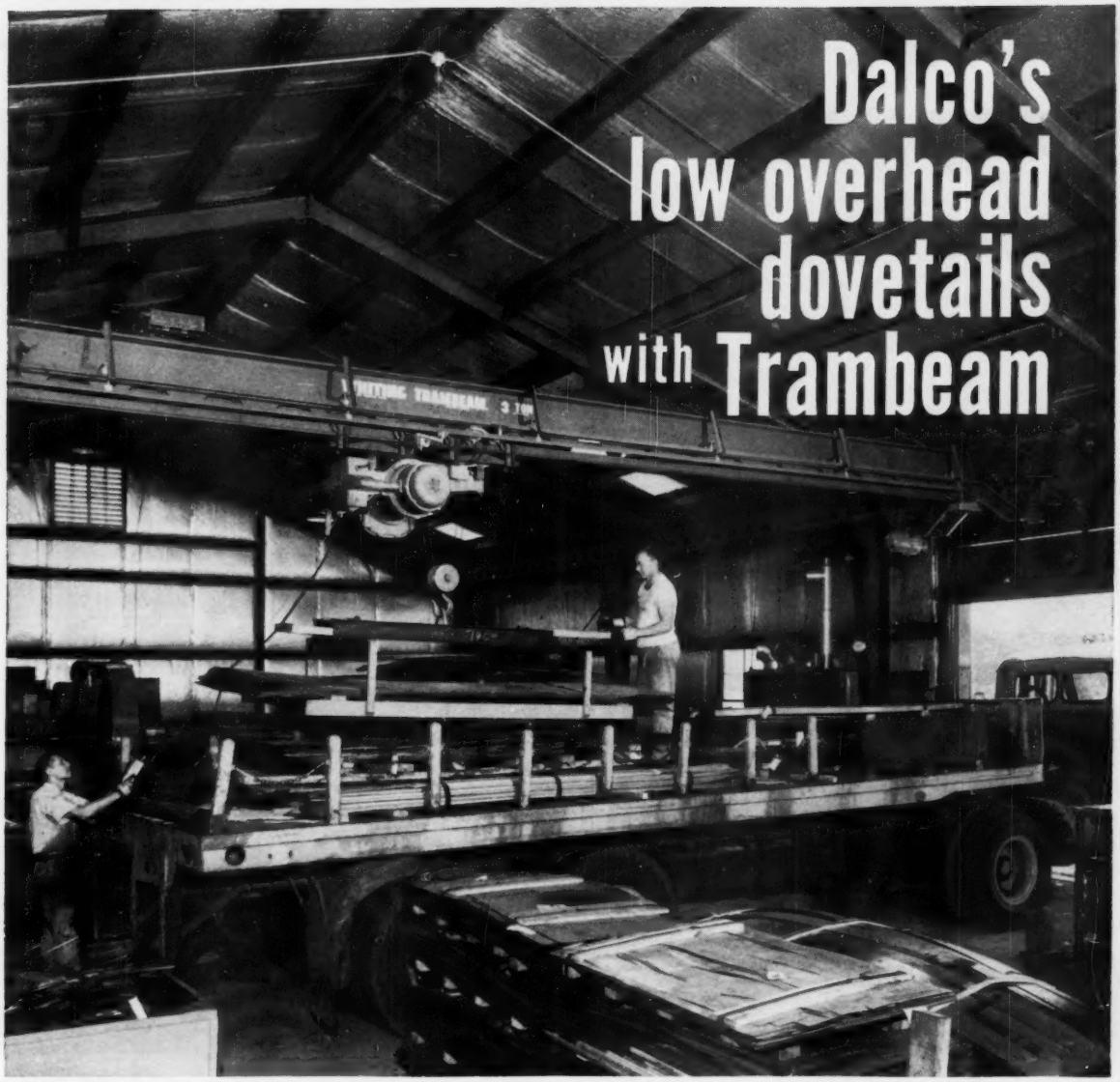
An Educator's Request

"Please send me 35 copies of your Feb. 29 article, 'Get Set for the Shock of Thermoelectricity,' for use in science classes at Hillsdale School, Pittsburgh," writes Mrs. Eileen B. Auner.

". . . When we have our Science Fair, at least one student will have worked out . . . an unusual way to apply the principles—a way adult engineers may never have thought possible (for 13 and 14 year olds have more imagination than any adult and have never heard of all the things that we know 'can't be done') . . ."

Mrs. Auner cited previous student projects, including how sound can be transmitted by light.

We gladly filled her request.



Dalco's low overhead dovetails with Trambeam

Dalco Metal Products Co. has achieved remarkable efficiency in its new metal fabricating shop at Crete, Illinois. It is an economical prefab with a low ceiling. Yet it easily accommodates a Whiting Trambeam Overhead Handling System. Running on underhung trucks, Trambeam crane rides high, and clears sloping roof beams by only 2". It puts maximum space to work, from the floor up, from wall to wall.

Greater material storage capacity permits quantity buying at a considerable savings. Trambeam serves during receiving, fabrication, shipping . . . speeds all three . . . cuts materials handling costs. By helping to *double* production, it has actually paid for itself within a year! For fresh ways to solve materials handling problems—for guaranteed service and quality—call on Whiting Trambeam!

FREE BULLETIN . . . "Ideas in Materials Handling"—typical money-saving Trambeam installations in production, shipping and storage. *Whiting Corporation, 15643 Lathrop Avenue, Harvey, Illinois.*

COST-SAVING EQUIPMENT...THE WAY TO HIGHER PROFITS

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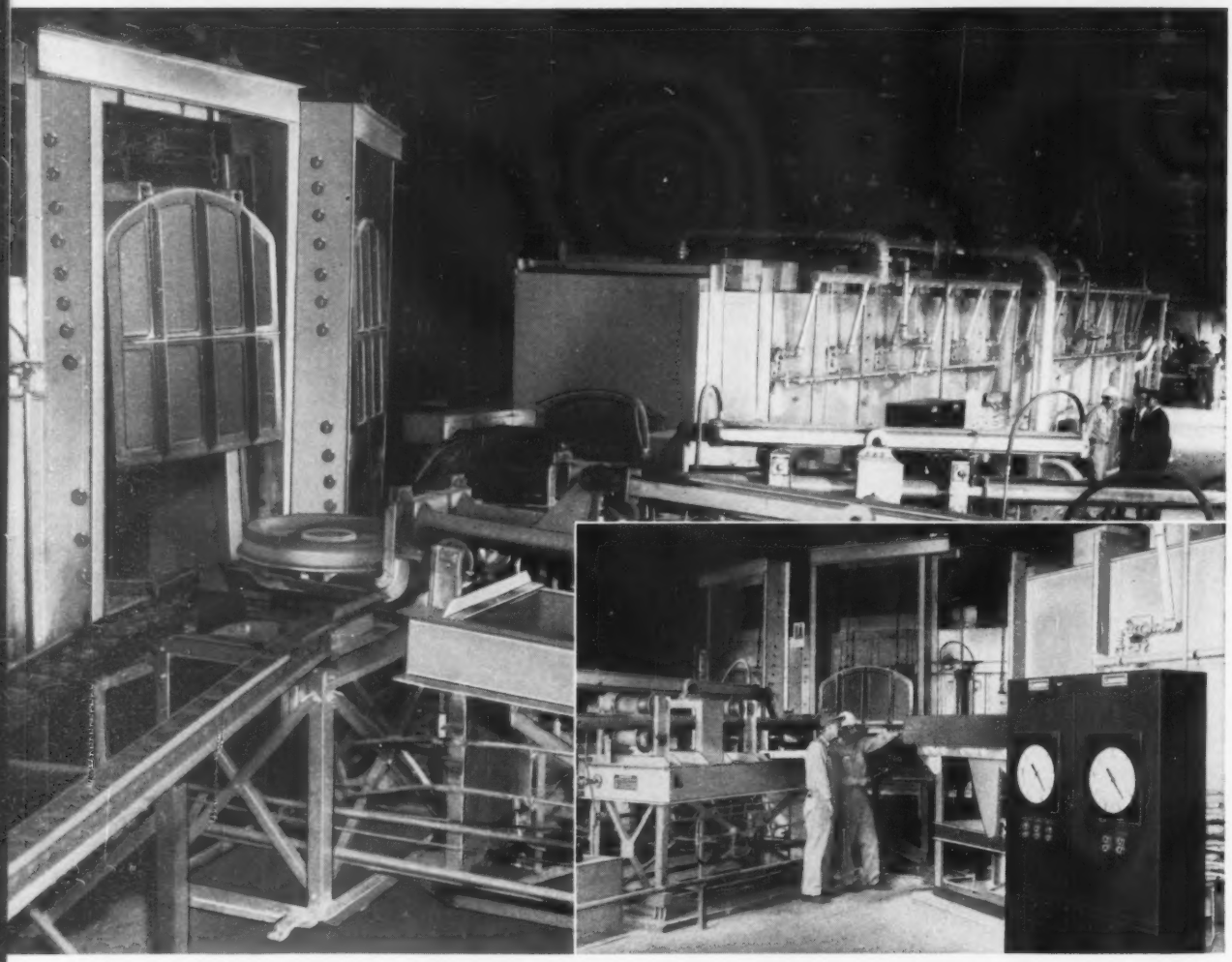
WHITING

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; TRACKMOBILES; FOUNDRY, RAILROAD, AND SWENSON CHEMICAL EQUIPMENT

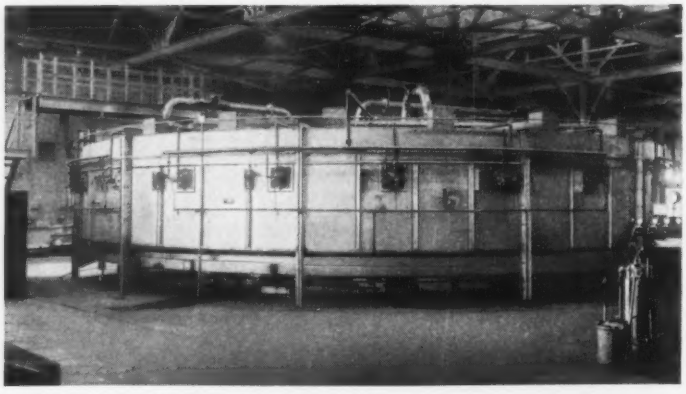
BIG JOBS ARE PART OF LINDBERG'S

Complete, automated heat treating installation at Griffin Wheel designed and installed



Several years ago, Griffin Wheel Company's plant at Colton, California began heat treating car wheels in a Rotary Hearth Furnace designed and installed by Lindberg Industrial Division. It was one of four similar installations at other Griffin plants in United States and Canada. Recently, when production at the Colton plant needed to be doubled, Griffin again called on Lindberg Industrial engineers to develop the necessary methods and equipment. The desired result was accompanied by a specially designed Preheat Furnace shown at the right above, engineered and installed by Lindberg Industrial and automated to work efficiently with the original Rotary Hearth Furnace. Inset shows the Lindberg control panels conveniently installed for operation of both furnaces.

The operation of both furnaces was completely automated. The above photo shows the charging of the Preheat Furnace and the automatic conveyor which moves the wheels through the Preheat Furnace and delivers them to the Rotary Hearth Furnace.



The original Rotary Hearth Furnace at Griffin has an outside diameter of 44'. Initial capacity of 13,000 lbs. per hour was doubled with the installation of the new Preheat Furnace.

FULL SERVICE

by Lindberg Industrial Division

A PLUS DIMENSION IN SERVICE TO USERS OF HEAT FOR INDUSTRY

Most everyone knows Lindberg as a builder of fine equipment for any industrial heating need. But there is a plus dimension to Lindberg's service that is available to any industry whose product requires heat in its making.

For such people we offer the complete designing, engineering, building and installation of the necessary equipment and facilities to process any product requiring heat—in the quality and quantity desired by its maker. This service covers broad requirements—plant layout and construction, when desired, complete, automated production lines or just specially engineered industrial heating equipment efficiently integrated into your production processes.

You obtain many advantages when you offer your industrial heating problems to Lindberg. You get the combined skills of what we believe to be the country's finest group of engineers and technicians in the industrial heating field, with many years experience in the solution of all types of "heat for industry" problems. You need give us only your end product specifications and you will get the installation, from one responsible source, guaranteed to achieve the results you need and ready to go to work at the turn of a switch.

Our experience covers the whole range of industrial heating methods so you can rely on us to recommend the processes most suited for your specific need.

Whatever size your installation need be, no matter how rigid your quality specifications are, turn the complete job over to Lindberg. You'll be happy with the results.

Lindberg Field Engineers are available in 23 major industrial centers in this United States and Canada (see classified telephone directory) or write direct to: Lindberg Industrial Division, Lindberg Engineering Company, 2321 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg, Ltd., Toronto.

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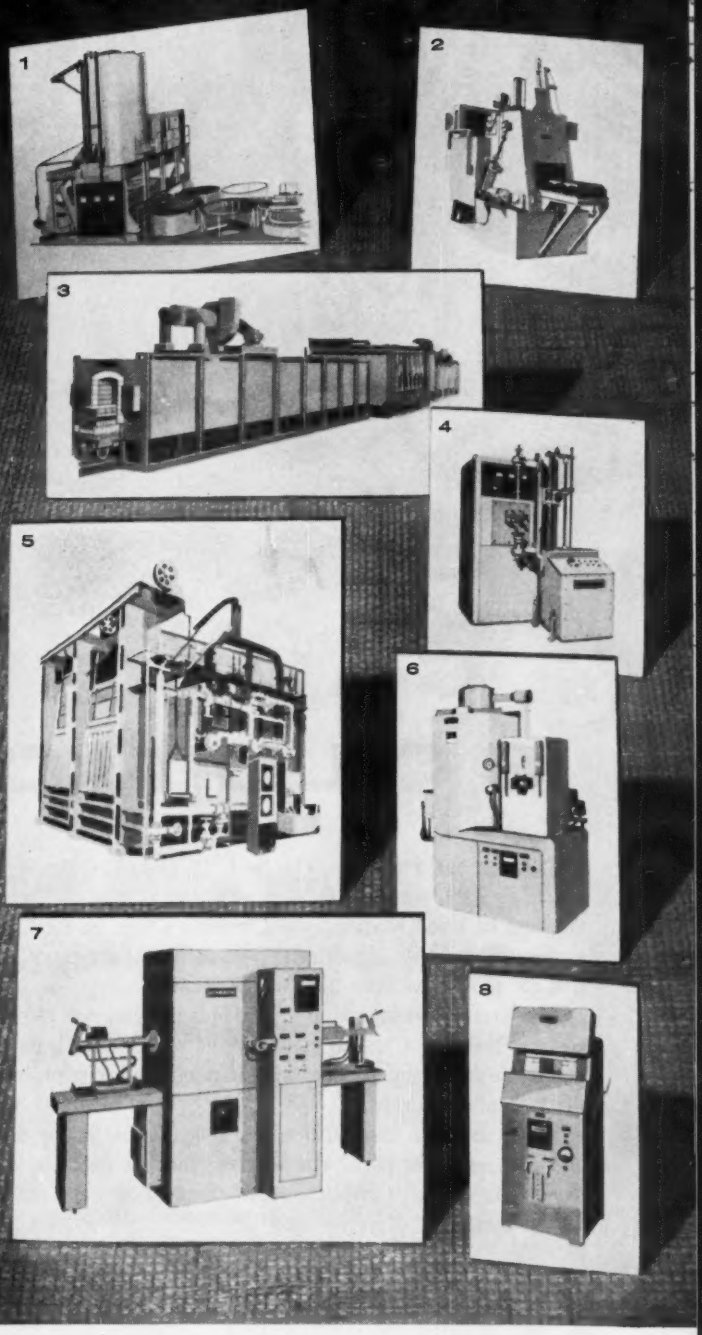
heat for industry

THERE'S LINDBERG EQUIPMENT FOR EVERY INDUSTRIAL HEATING NEED



1 Gantry Type Furnaces: Lindberg Industrial Division has installed a number of Gantry Type Furnaces with auxiliary equipment for heat treatment of missile and rocket components.

2 Heat Treating Furnaces: For every requirement, large or small, electric or fuel fired, factory built or field-installed. Shown: Automated Integral Quench Type Carbonitriding Furnace.

3 Ceramic Kilns: All types of kilns: automatic, atmosphere controlled, high temperature, tunnel and periodic. Shown: Tunnel Kiln with two automatic control zones for temperatures up to 3200° F.

4 High Frequency Units: Complete range of induction heating units and furniture. Shown: New Floating Zone Scanner for production of hyperpure materials for semi-conductors.

5 Melting and Holding Furnaces: Equipment for any non-ferrous metal requirement including electric resistance and two chamber induction types, reverberatories, dry hearths and crucibles. Shown: Field-installed Reverberatory Furnace, 80,000 lb. capacity.

6 Atmosphere Generators: Generators for all required furnace atmospheres. Shown: Hyen Generator for endothermic atmospheres.

7 Pilot Plant Equipment: Complete group of intermediate sized furnaces for pilot plant and small production application. Shown: New Graphite Tube Furnace, temperature range 2500° F. to 5000° F.

8 Laboratory Furnaces: Complete line of laboratory furnaces from simple hot plates to specialized research units. Shown: Versatile, wide temperature range Laboratory Box Furnace.

CAUSTIC SOLUTION

A CASE IN POINT—This is a 19 pound Ni-Resist valve body designed to handle caustic fluids at 400 psi. It was cast for the John Bean Division of Food Machinery & Chemical Corp. Ni-Resist is ideal for this application because it combines high corrosion resistance with superior resistance to erosion from high velocity fluids.

The intricate coring required demands unusual skill to produce Ni-Resist castings leak-proof at 400 psi operating pressures. Hamilton Foundry succeeded in producing pressure tight castings, an accomplishment difficult for the best of foundrymen.

When new and unusual design problems arise in the selection of metal and the casting of parts, you will find that the skill and integrity of your foundry is your best insurance that specifications—and delivery schedules—will be met.

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CALENDAR OF MEETINGS

Mar. 21-23, American Management Association: Special manufacturing conference, LaSalle Hotel, Chicago. Association's address: 1515 Broadway, New York 36, N. Y.

Mar. 22-24, Society of Automotive Engineers Inc.: National production meeting, Statler-Hilton Hotel, Cleveland. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Mar. 23-24, Instrument Society of America: Annual Iron & Steel Conference, Pick-Roosevelt Hotel, Pittsburgh. Information: R. E. Blackwell, Box 1346, Pittsburgh 30, Pa.

Mar. 23-25, Pressed Metal Institute: Spring technical meeting, Carter Hotel, Cleveland. Institute's address: 3673 Lee Rd., Cleveland 20, Ohio. Managing director: Harold A. Daschner.

Mar. 27-31, Scientific Apparatus Makers Association: Annual meeting, Boca Raton Hotel & Club, Boca Raton, Fla. Association's address: 30 N. Wacker Dr., Chicago 6, Ill. Executive vice president: Kenneth Andersen.

Mar. 28-29, Material Handling Institute Inc.: Spring meeting, Pittsburgh-Hilton Hotel, Pittsburgh. Information: Hanson & Shea Inc., 1 Gateway Center, Pittsburgh 22, Pa.

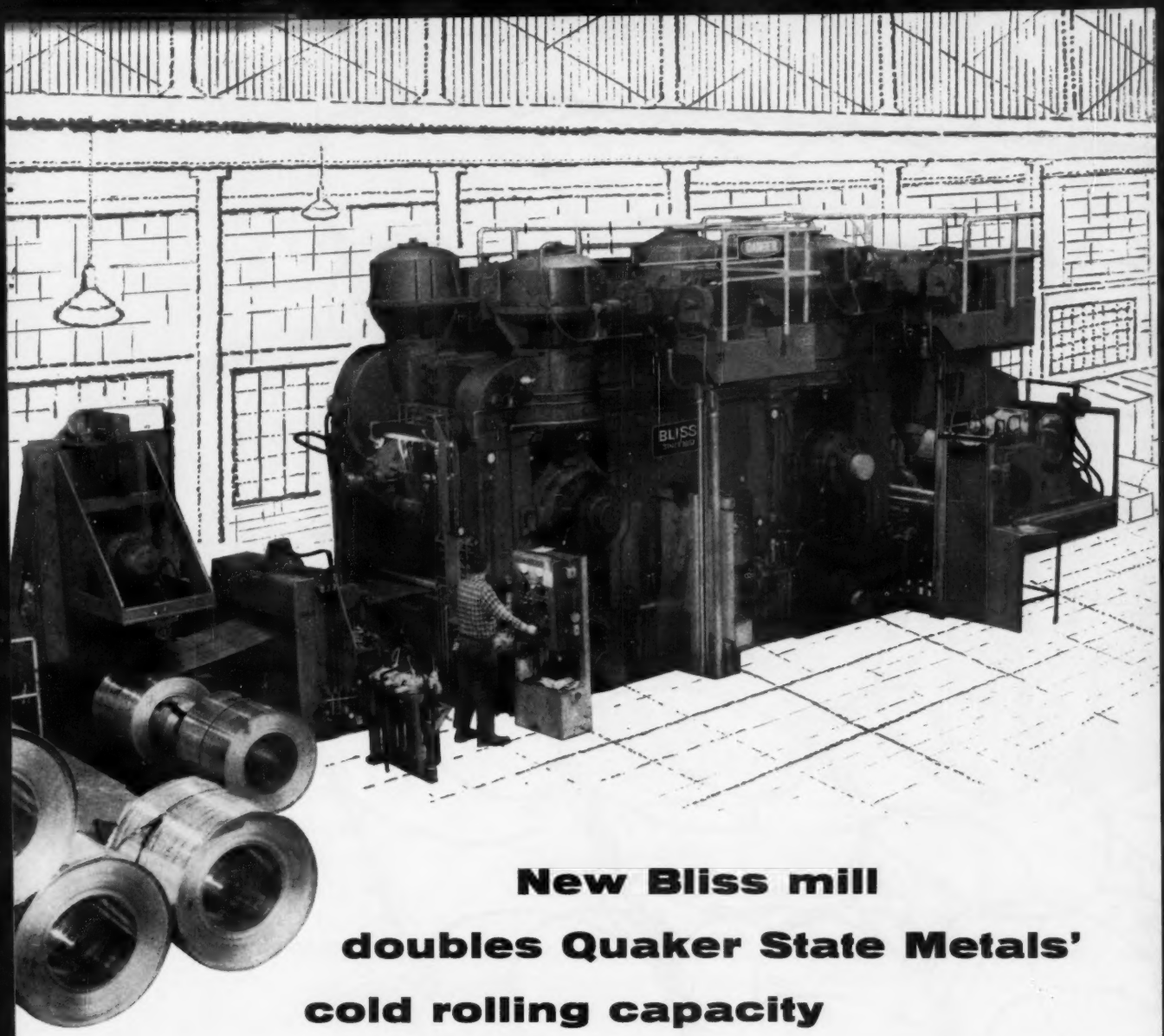
Mar. 30, Industrial Truck Association: Spring meeting, Pittsburgh-Hilton Hotel, Pittsburgh. Information: Hanson & Shea Inc., 1 Gateway Center, Pittsburgh 22, Pa.

Apr. 3-6, National Screw Machine Products Association: Annual meeting, Ambassador Hotel, Los Angeles. Association's address: 2860 E. 130th St., Cleveland 20, Ohio. Executive vice president: Orrin B. Werntz.

Apr. 4-6, Metallurgical Society of AIME: Annual national open hearth steel conference and blast furnace, coke oven, and raw materials conference, Palmer House, Chicago. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

Apr. 4-6, National Industrial Conference Board Inc.: Annual atomic energy conference, Waldorf-Astoria Hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Apr. 4-7, American Management Association: Packaging show and conference, Convention Hall, Atlantic City, N. J. Association's address: 1515 Broadway, New York 36, N. Y.



New Bliss mill doubles Quaker State Metals' cold rolling capacity

With a rolling capacity now approaching 10 million pounds a month, Quaker State Metals Company of Lancaster, Pa., division of Howe Sound Co., ranks as one of the largest independent rollers of aluminum in the United States.

A new Bliss tandem mill is a key unit in Quaker State's recently completed expansion program. In production a week after its erection was completed, the mill has more than doubled the plant's cold rolling capacity.

It reduces strip from .250 inch to .062 inch in a single pass. Delivery speed is 1500 fpm. Coil handling is completely mechanized, utilizing a coil opener equipped with a peeler knife and an automatic guide control.

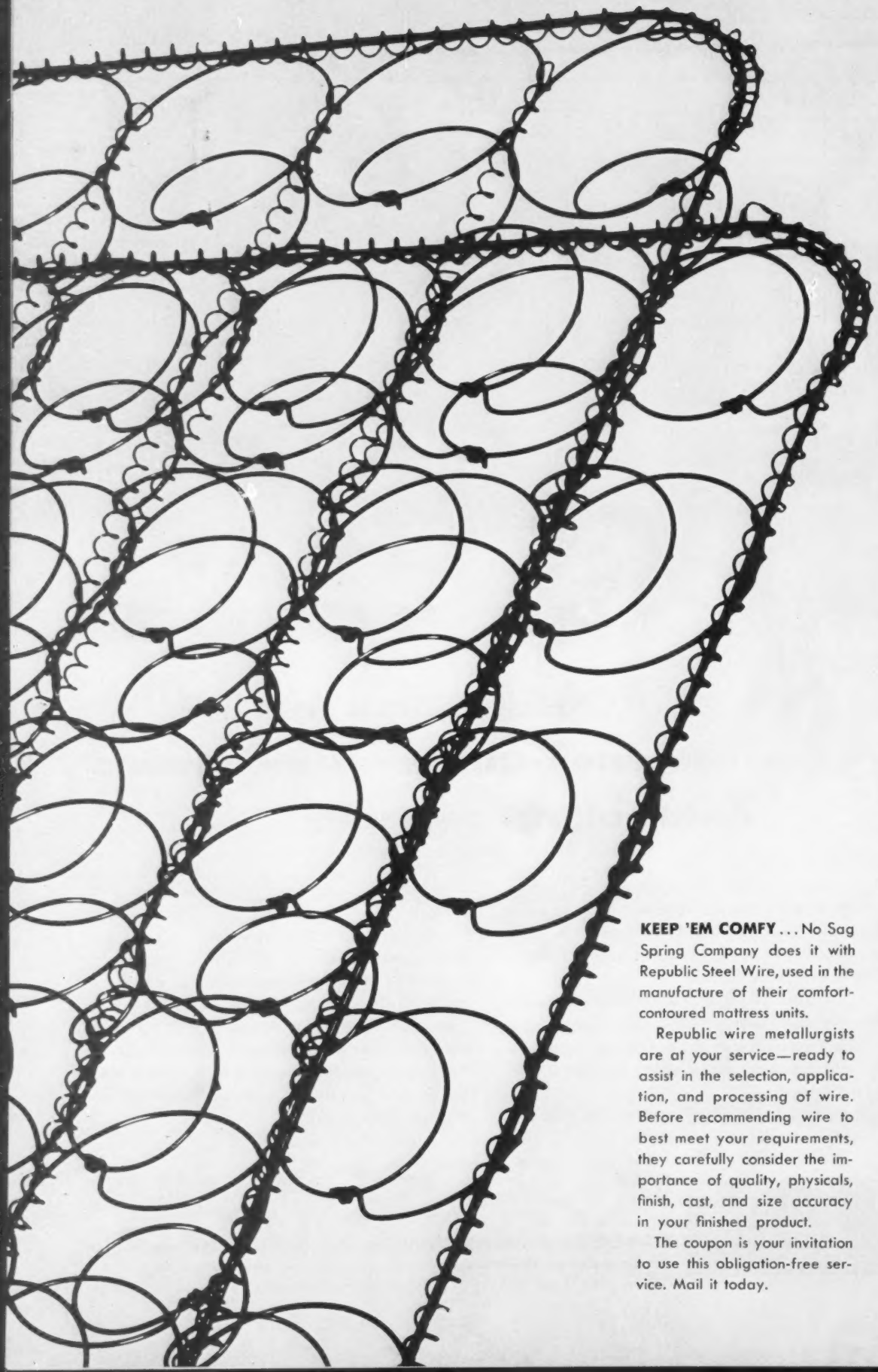
Whether your own plans call for the addition or modernization of a single unit or a complete rolling plant, you'll find that the Bliss Rolling Mill Division can help you with the problems you may encounter. For examples of Bliss installations for rolling both ferrous and non-ferrous materials, write for our 84-page Bulletin 40-B.

BLISS
SINCE 1857 ®

Bliss is more than a name . . . it's a guarantee

E. W. BLISS COMPANY, Rolling Mill Division, Salem, Ohio

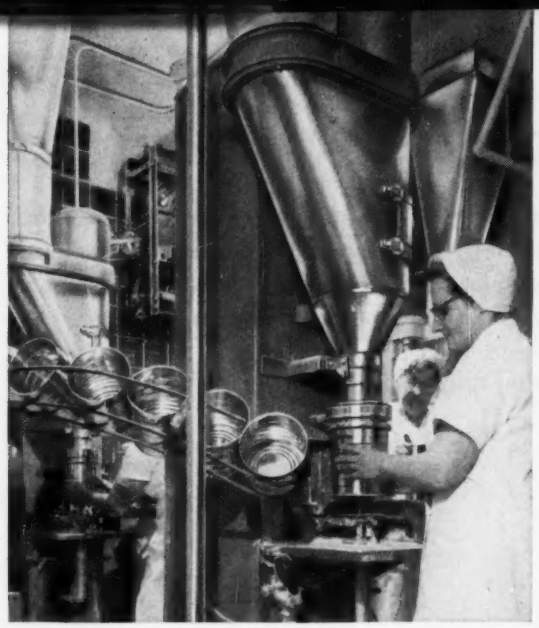
Subsidiary: The Matteson Equipment Company, Inc., Poland, Ohio



KEEP 'EM COMFY... No Sag Spring Company does it with Republic Steel Wire, used in the manufacture of their comfort-contoured mattress units.

Republic wire metallurgists are at your service—ready to assist in the selection, application, and processing of wire. Before recommending wire to best meet your requirements, they carefully consider the importance of quality, physicals, finish, cast, and size accuracy in your finished product.

The coupon is your invitation to use this obligation-free service. Mail it today.



CONVENIENCE, sanitation, and quality protection—yours when you send your product to market in cans made of Republic Tin Plate. Republic Electrolytic Tin Plate is ideal for food, oil, paint, and beverage containers—is made by the cold reduction process which provides all the properties necessary for making tin containers on high-speed automatic machines.

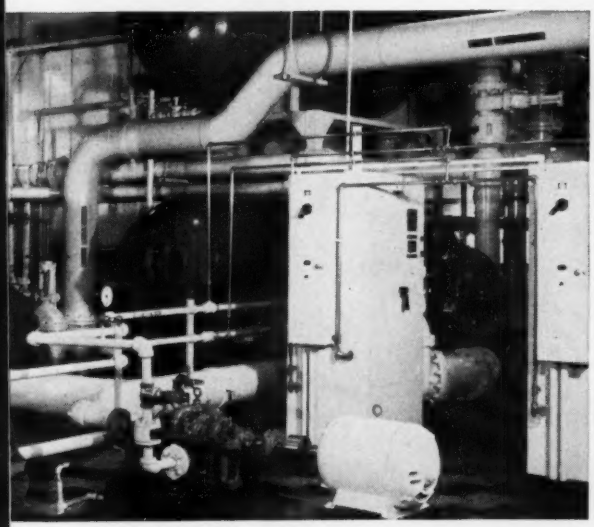
Republic also produces black plate for such applications as lacquered cans and light stampings.

COMFORT, CONVENIENCE, and QUALITY

Are built into products made with Republic Steels

CONSISTENT QUALITY and full-range production experience have made Republic the nation's number one producer of carbon and alloy bars—and leader in the production of special quality steels, such as forging bars.

You benefit from Republic's leadership in many ways. You select from widest selection of shapes and sizes—can call on Republic's famed Metallurgical Service Teams for expert assistance in selection, application, and processing. Republic bar mills are strategically located in major use centers for fast dependable delivery to you.



LONG-LIFE, low-cost Republic Steel Pipe, first choice of operations and maintenance men to handle dozens of tough industrial jobs.

Constant quality control from iron ore to finished product, gives you pipe of outstanding uniformity in quality, size, and strength. The tight, galvanized coating of Republic Steel Pipe stubbornly resists corrosion and fabrication damage. For more information, mail the coupon.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
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☐ Have a Wire Metallurgist call.
Send more information on:

☐ Spring Wire
☐ Steel Pipe
☐ Tin Plate
☐ Carbon and Alloy Bars

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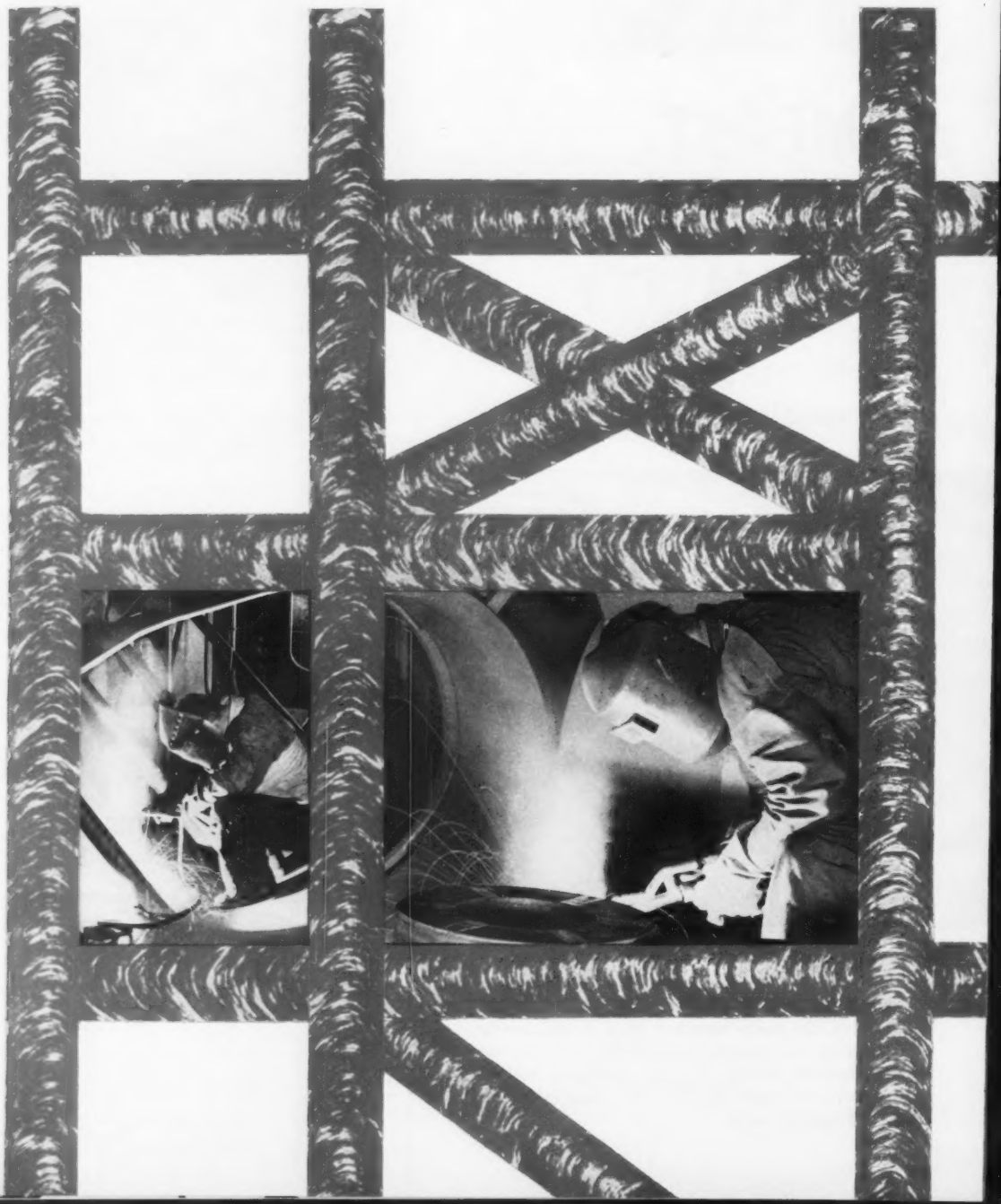
Company_____

Address_____

City_____ Zone____ State_____

new Westinghouse iron powder-coated electrodes enable

For superior, faster, easier welding, try the new ZIP-10 electrodes—latest advance from Westinghouse research and development. Key to the ZIP-10's performance: a special iron-powder coating that helps boost welding speed . . . makes welding easier because of more spray-type metal transfer . . . permits instant restrike whether the tip is hot or cold. With ZIP-10 iron powder-coated electrodes, welds are smooth, strong, continuous . . . free from breakdowns, pin holes, puffing craters. Undercuts are reduced. Slag is simple to remove. And the ZIP-10 produces outstanding welds regardless of the position in which they are held.



faster welding, instant restrike, hot or cold

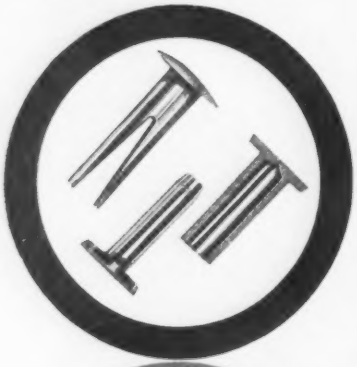
Check your nearest franchised Westinghouse welding distributor about the new ZIP-10, one of a series of iron powder-coated electrodes . . . as well as the other electrodes in the complete Westinghouse line. Write Westinghouse Electric Corporation, Welding Department, 4454 Genesee Street, Buffalo 5, New York, for a pocket-sized electrode selector booklet.

J-10482

watch Westinghouse for new developments in welding

YOU CAN BE SURE...IF IT'S Westinghouse

COST PREVENTION... NOT COST REDUCTION... IS THE EFFICIENT WAY TO LOW-COST ASSEMBLY



The 'in-place' cost of a fastener is what really counts to cost-conscious production men. By deciding on inexpensive Milford tubular rivets as a fastening method and installing them with Milford automatic rivet-setting machines, design and production engineers are eliminating costs at the initial production stage rather than trying to reduce costs later at the assembly line. Write for more information.

THE MILFORD RIVET & MACHINE CO.

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BETHNAMEL

a brand ***NEW*** *kind of* ***STEEL SHEET***
for porcelain enameling

BETHLEHEM STEEL

NEW BETHNAMEL

...superb results at low costs ...for either two-coat or direct-on porcelain enameling

BETHLEHEM STEEL

Here is a totally new kind of steel sheet which provides a really outstanding enameling job, not only in the standard two-coat process but for single, "direct-on" cover coating too.

Developed by Bethlehem research engineers, Bethnamel is produced by an entirely new method. This new sheet has the amazingly low carbon content of about .003 pct, barely 1/10th that of ordinary enameling iron. Other elements are properly balanced to maintain superb enameling properties, and provide good sag resistance, drawability, and weldability, as well.

Single-Coat with Minor Changes in Cycle

With Bethnamel, boiling and fish-scaling are no problem, making this remarkable new sheet far superior to other enameling materials in the direct-on cover coat process. Simple, inexpensive modifications of existing two-coat pre-treatments are all that are needed to assure excellent adherence and rich appearance of the enamel.

Direct-on Method Cuts Costs

Bethnamel costs no more than conventional enameling iron. Thus enamelers can save on processing without adding to base metal costs. Bethlehem engineers are anxious to help you get started with this superior enameling sheet. If you're interested, by all means let our nearest sales office give you full details.

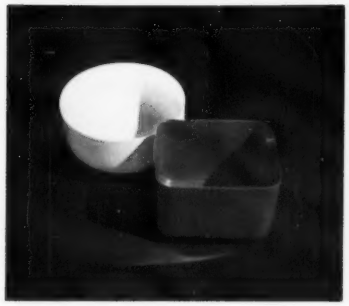
RANGE TOPS DEEP-DRAWN at Caloric Appliance Corp., Topton, Pa., are unusually tough draws, because of the relatively sharp corners. Bethnamel sheets take this severe drawing beautifully, prior to enameling.

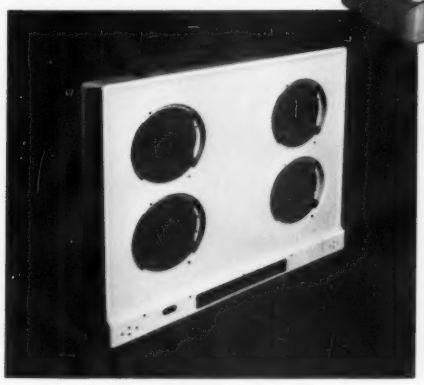
GAY PORCELAIN-ENAMELED PANELS on this school speak for the rapid growth of colorful curtain wall construction. Bethnamel sheets have proved ideal for these applications, due to high sag resistance and excellent enameling properties.

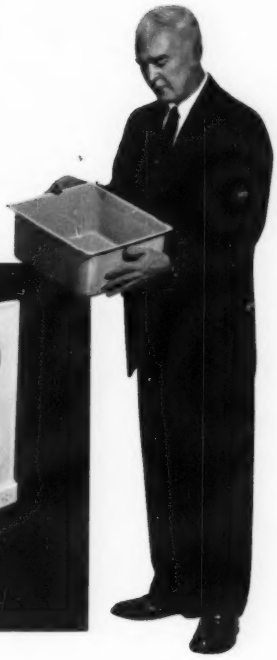
BETHLEHEM ENGINEERS WILL

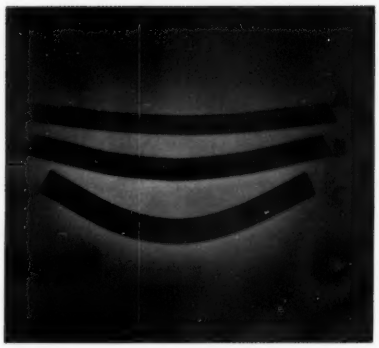
BETHNAMEL EASY TO DEEP-DRAW

Drawing-quality Bethnamel sheets can be deep-drawn with superior results, as shown in this group of tough-to-make porcelain-enameled articles. No splits or cracks here!



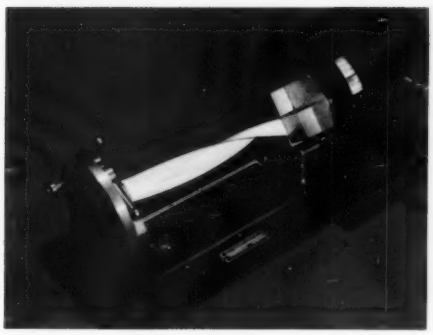






SUPERIOR SAG RESISTANCE

These 20-ga samples of Bethnamel (A), enameling iron (B), and cold-rolled steel (C), demonstrate that Bethnamel's sag resistance is better than that of enameling iron, and far superior to cold-rolled sheet steel, at firing temperatures of 1600 degrees.



ENAMEL THAT REALLY STAYS ON

In this torsion test, a simple angle of direct-coated Bethnamel was twisted 180 degrees without damage to the enamel. Because its thickness is only 3 to 4 mils, compared to 6 to 8 mils or more for 2 coats, a direct-on enamel can withstand much rougher handling!

TYPICAL MECHANICAL PROPERTIES
20-Gage Bethnamel Sheet

	Yield Strength (psi)	Tensile Strength (psi)	Total Elongation	Rockwell B	Olsen Cup Test (inches)
Longitudinal	26,000	43,000	38 pct	43	0.425
Transverse	28,000	44,000	40 pct		

HELP YOU WITH YOUR STEELWORKING PROBLEMS

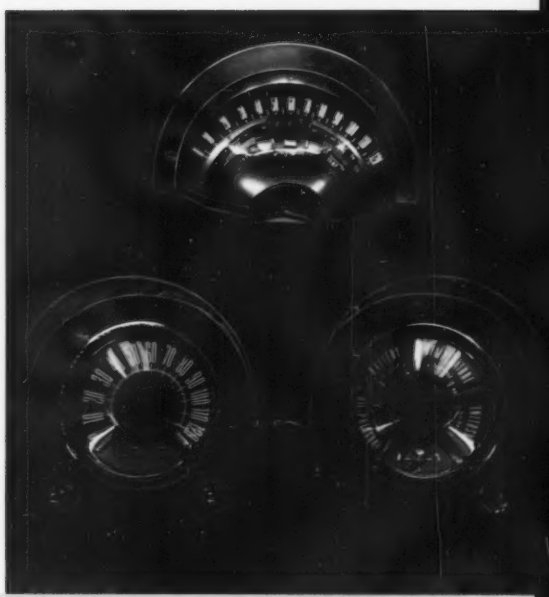
BETHLEHEM STEEL

NEW BETHNAMEL
lights up like a lamp!

Now sheet-steel-and-ceramic panels can light up a room without bulbs, tubes, filaments, or cathodes! Called Panelescent® Lighting, this revolutionary "area" source of light is a development of Sylvania Lighting Products. A whole ceiling can become one huge lamp, or specific portions of an area can be lighted up, as in the automobile instrument panels shown here.

New Bethnamel sheet steel is proving to be a very practical base metal for Panelescent® applications. Sylvania is just one of many companies which are growing increasingly enthusiastic about Bethnamel. The future looks bright, both for Bethnamel and the porcelain enameling industry!

"Panelescent®" is Sylvania's registered trade name for electroluminescence



Steel
is strong, ductile, versatile... AND BETHLEHEM MAKES IT IN NEARLY EVERY FORM

Here's a partial list of steels and specialty products in the Bethlehem line:

BARS AND BILLETS:
Carbon and alloy AISI grades
Concrete reinforcing bars
Leaded steels
Special rolled sections

TOOL STEELS:
Water, oil, and air-hardening grades

ROD AND WIRE:
General and special-purpose types
Fine and shaped wire

FORGINGS:
Drop, press, hammer, and upsetter
Rolled-and-forged sections

SHEETS:
Hot- and cold-rolled
Continuously galvanized
Enameling sheets

TIN MILL PRODUCTS:
Electrolytic and hot-dip tinplate; blackplate

PLATES:
Universal and sheared
Flanged and dished heads

FASTENERS:
Bolts, cap screws, rivets
Special fasteners

STEEL PIPE:
Continuous butt-weld
Electric resistance-weld

STRUCTURAL SHAPES

COLD-FORMED SHAPES

PALLET RACKS

WELDMENTS:
Frames, tanks, housings, vessels

FREIGHT CARS, PARTS, WHEELS, AXLES

WIRE ROPE AND SLINGS

RAILS:
Tee, crane, girder

CASTINGS:
Carbon, alloy, and stainless steel
Iron, brass, bronze

Room 1041,
Bethlehem Steel Company, Bethlehem, Pa. M10

Please send me literature describing these products:

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Name_____

Company_____

Address_____

City_____ Zone_____ State_____

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

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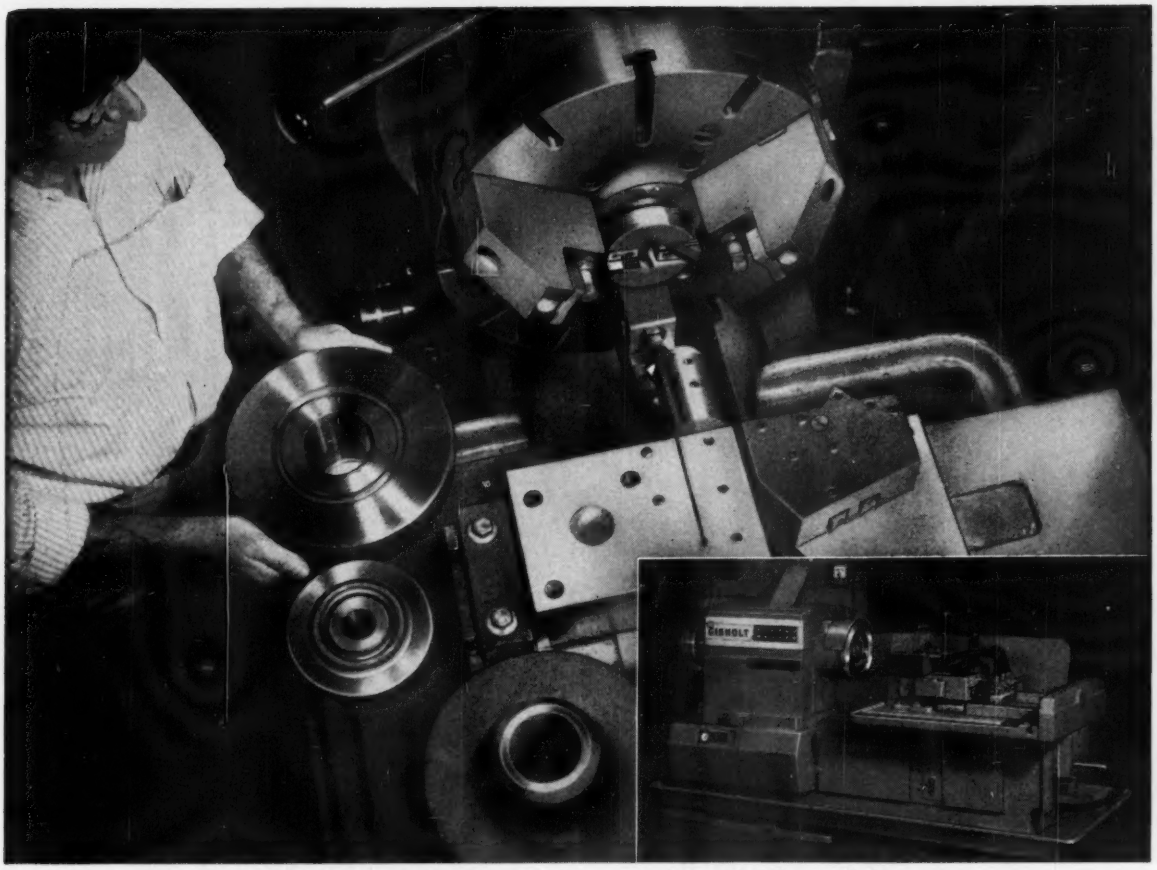
BETHLEHEM STEEL

BETHLEHEM STEEL



Smart planning on Simplimatic holds f.t.f. time to 1.7 min. on 6½" diam., 3.3 min. on 10¾" diam. workpieces.

How OTM Corp. cuts costs machining parts in 13 sizes

Handles each part in single chucking, using Simplimatic with back-facing attachments and two-speed motor

You may get ideas from the way OTM Corporation, Houston, Texas, machines steel welding neck flanges and welding necks—with each part in 13 different sizes—completing each part in a single chucking and holding change-over time to an absolute minimum.

Here's how the job is done on a Gisholt Simplimatic Automatic Lathe: Facing, grooving, boring and chamfering operations are performed from tools on short tool slides, with T-slotted tops for quick adjustment. Relieving the boring tool at the end of the cut eliminates tool tracks. Simultaneously, a special back-facing attachment works through the spindle to shave-face and chamfer the O.D. on the hub. A power chuck wrench operates the scroll chuck and permits mounting this attachment in the spindle bore. A two-speed motor provides correct surface speed and permits switching from high speed (for turning and facing) to low speed (for grooving operation) and back again, during the Simplimatic's automatic machining cycle.

Here, again, the Gisholt MASTERLINE Simplimatic Automatic Lathe saves a manufacturer the cost of a special machine. Its extra wide platen table provides ample space for an infinite number of slide and tool arrangements—and its table feed permits tools to engage with the work or perform additional machining operations before actual slide movements begin. Ask your Gisholt Representative to show you how the Simplimatic performs special machine functions at standard machine prices—on your product and under your production conditions.

MASTERLINE GISHOLT SINCE 1887 GISHOLT

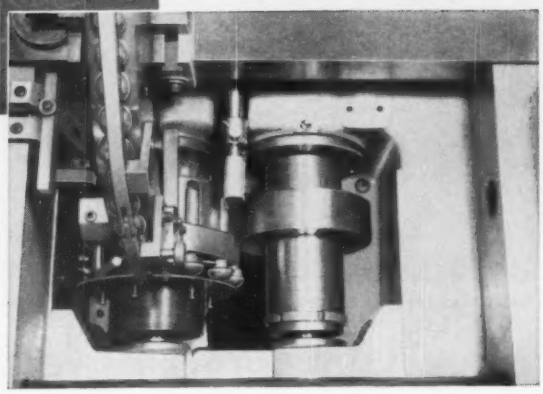
GISHOLT MACHINE COMPANY

Madison 10, Wisconsin, U.S.A.

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY REBUILT MACHINES WITH NEW MACHINE GUARANTEE

automated

THREAD ROLLING



The automatic features of the LANHYROL Thread Rolling Machine have enabled a large industrial fastener and related parts company to automate its process for producing button head oval neck track bolts. ¾" 10 pitch UNC threads are rolled 1¾" in length to Class 2A fit.

One man now handles the entire operation, eliminating difficult and costly handling of hot-forged bolt blanks required in the old process. Now . . . bolt blanks are cold-formed from 800-lb. coils of hot-rolled steel wire by passing through a wire-drawer into a two-blow header, conveyed to a hopper, threaded by Continuous Rolling on the LANHYROL Machine, and ejected as finished parts into a bin for removal.

Continuous Rolling (illustrated) is one of three thread-rolling methods utilized by the LANHYROL Machine. Blanks are delivered from a hopper to an automatic, indexing-type workrest. This indexes the pieces according to a preset cycle into and away from the rolling position. There, thread-rolling is accomplished by two opposed cam-type rolling dies.

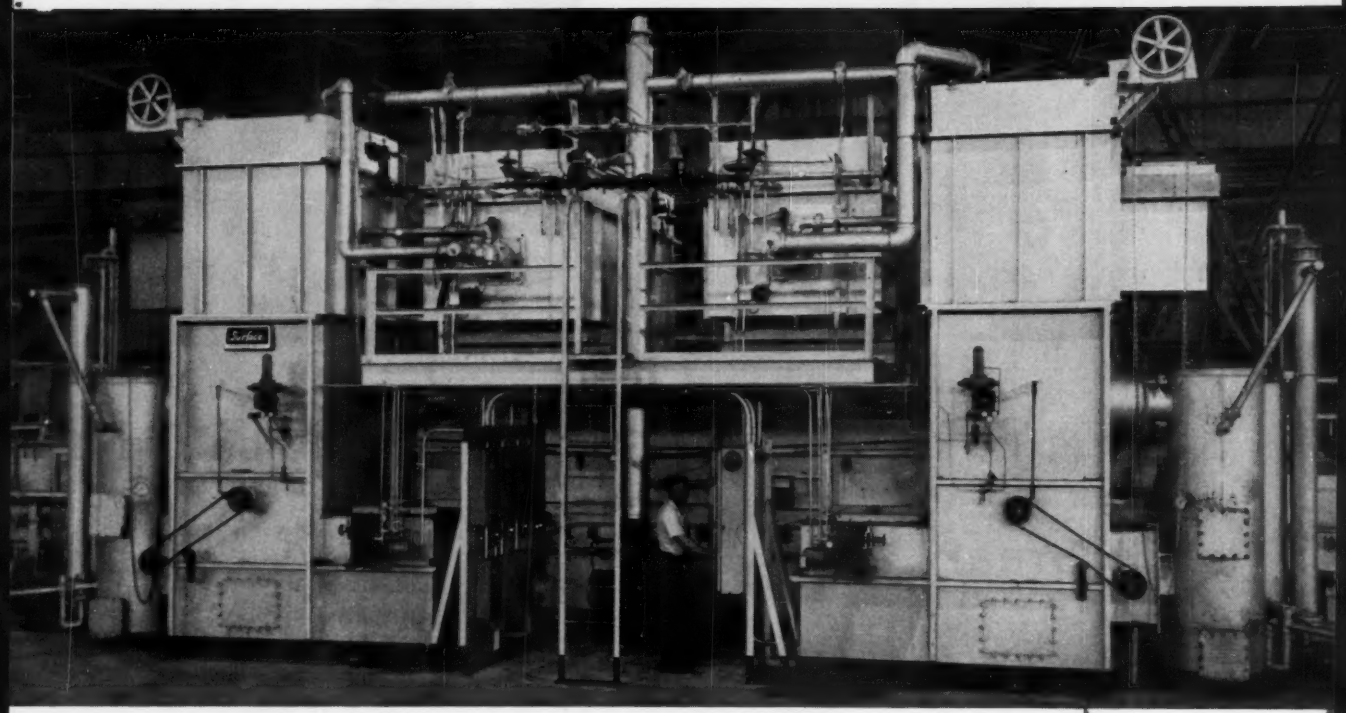
Although the LANHYROL is capable of rolling 80 track bolts per minute, in this application it is only operated to slightly exceed the production rate of the header which is 60 blanks per minute. Thread finish is considerably improved over previous methods and roll life is excellent . . . more than ¾ of a million bolts have been threaded to date with the original roll dies.

The LANHYROL Machine produces excellent threads at unequalled rates of output, and its method of operation fits well into automated processes. For information on its unusual range and flexibility, and the Infeed and Thrufeed thread rolling methods, send specifications and ask for Bulletin E-60.

494

LANDIS *Machine* COMPANY

WAYNESBORO · PENNSYLVANIA



SURFACE POWER CONVECTION

speeds annealing rate to 8,000 lbs/hr of brass tubing

This furnace is one of Scovill Manufacturing Company's (Waterbury, Connecticut) answers to the threat of imported brass and copper mill products.

Scovill is after new highs in production and quality in its new streamlined tube mill at New Milford, Conn. This continuous roller hearth furnace, equipped with Surface Power Convection, helps achieve both goals. It anneals and cools 8,000 lbs. of brass and cupro-nickel tubing an hour. At the same time, it produces tubing of superior physical properties because it maintains temperature uniformity at plus-minus 8° F.

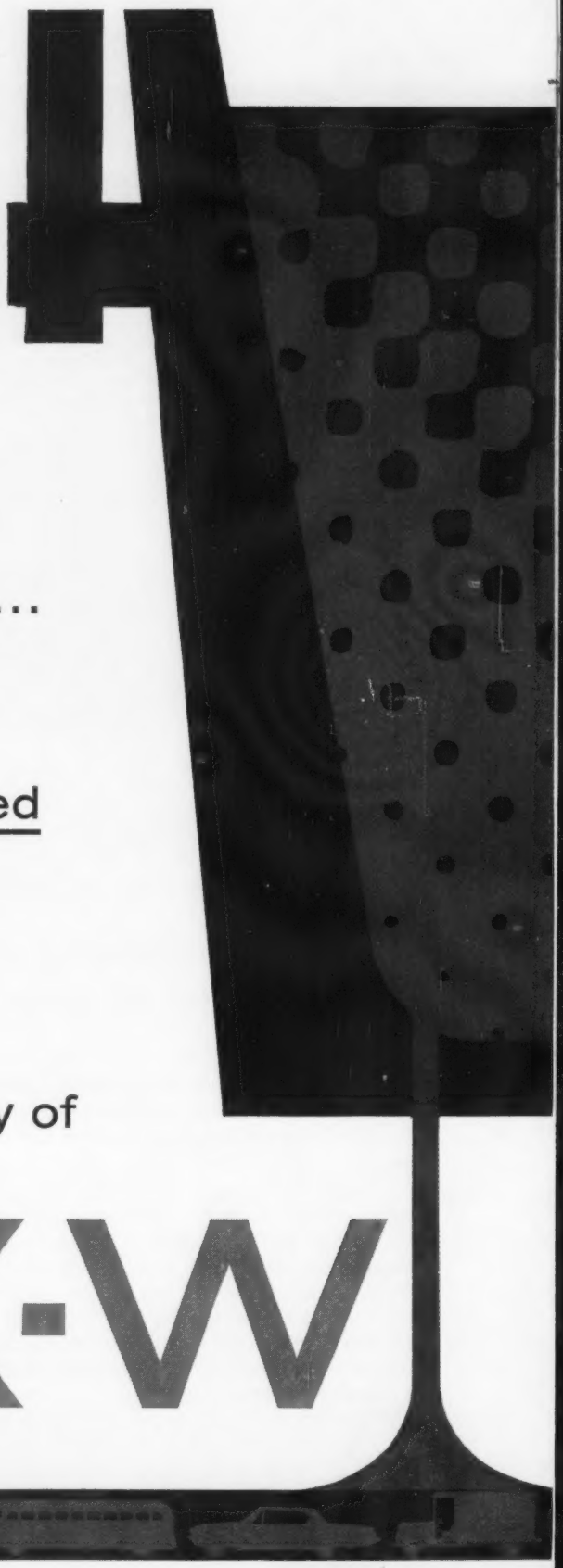
Such process speeds and temperature uniformity are possible only with Surface Power Convection, the most important advance in convection heat transfer in 20 years. Ask your Surface representative how you can apply this profitable new technology to your products. **Write for Bulletin SC-182.**

SURFACE COMBUSTION · 2385 Dorr Street, Toledo 1, Ohio
A DIVISION OF MIDLAND-ROSS CORPORATION

In Canada: Surface Industrial Furnaces, Ltd., Toronto, Ontario

Surface

wherever heat is used in industry



New...

from Great Lakes Steel...

columbium makes the

difference in fine-grained

GLX-W steel. For the

products you make,

investigate the economy of

GLX-W

Compare the benefits of GLX-W with other mild carbon steels

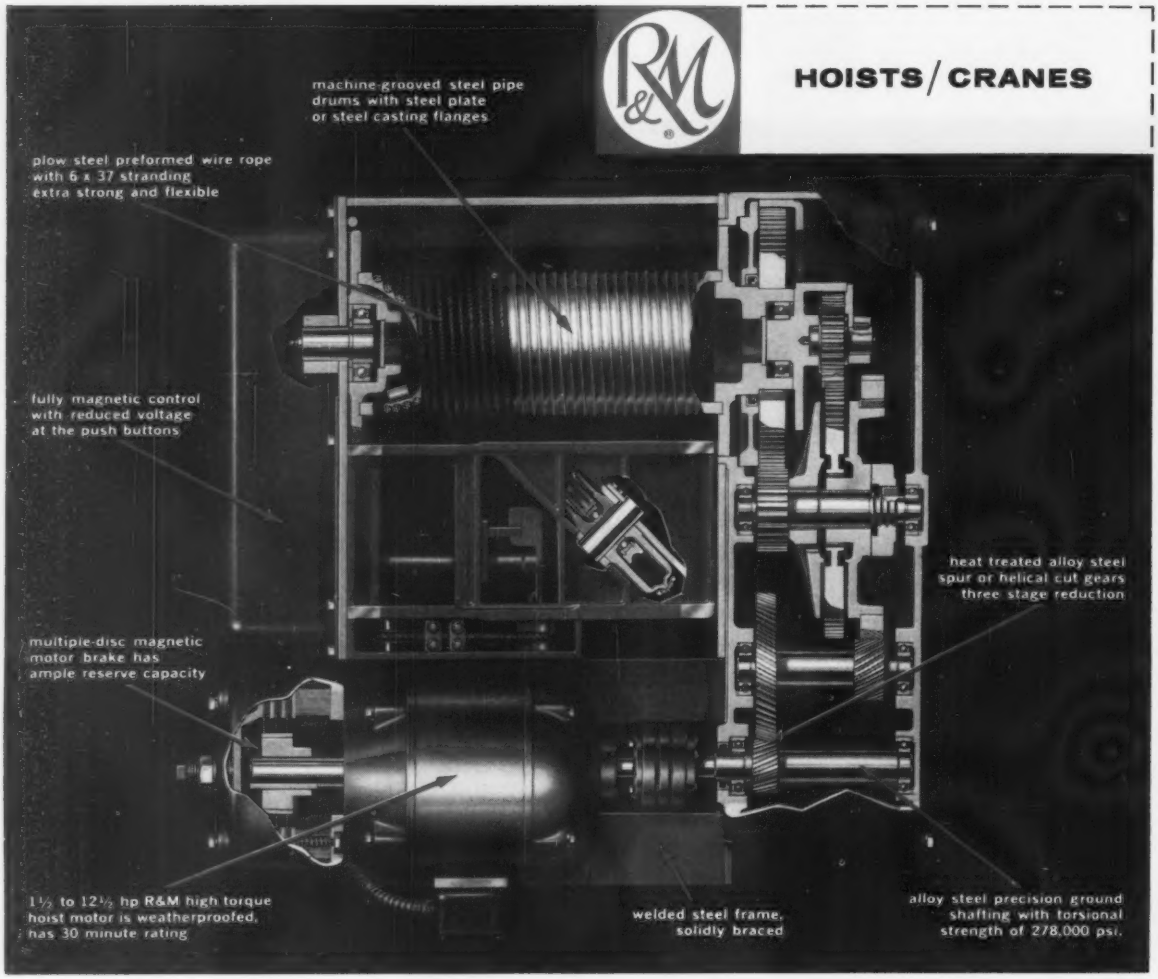
GLX-W gives you great yield strength—up to 60,000 psi—thanks to the finer grain structure that comes from columbium treatment. This greater strength permits designers to save up to 35% in weight, compared with ordinary carbon steels.

At the same time, GLX-W gives you the formability and weldability—with no underbead cracking—of regular carbon steels. It is recommended for a wide range of applications. Get complete details from our Product Development Division, Dept. B-13.

GLX W

GREAT LAKES STEEL
Detroit 29, Michigan

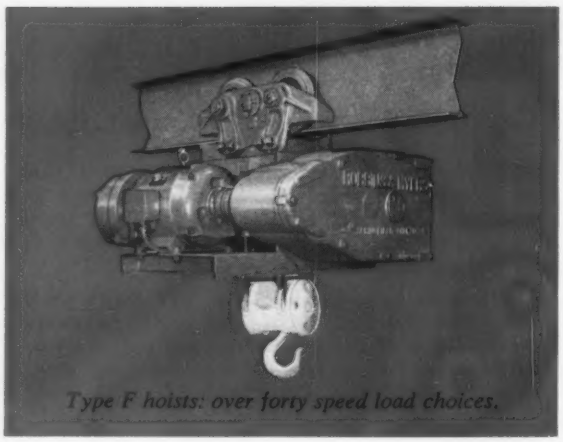
Great Lakes Steel is a Division of **NATIONAL STEEL CORPORATION**


machine-grooved steel pipe drums with steel plate or steel casting flanges
plow steel preformed wire rope with 6 x 37 stranding extra strong and flexible
fully magnetic control with reduced voltage at the push buttons
multiple-disc magnetic motor brake has ample reserve capacity
1½ to 12½ hp R&M high torque hoist motor is weatherproofed, has 30 minute rating
welded steel frame, solidly braced
heat treated alloy steel spur or helical cut gears three stage reduction
alloy steel precision ground shafting with torsional strength of 278,000 psi.

HOISTS / CRANES

LOW HEADROOM HOIST FOR HARD USE

Robbins & Myers heavy duty Type F hoists have compact, beam-hugging profiles to save overhead space in your plant. For example, the F-2 has a headroom of only 17″, yet provides 2 ton lifts on a path of steel extending from beam to hook. And F hoists are built for toughest use: frame is welded steel, alloy steel gears are heat treated, ball and roller bearings are used throughout. Weatherproof R&M 220/440 v.a.c. motors–to 12½ hp–drive through three gear reductions. These are the hoists to choose for day-after-day production lifting where maximum dependability is important. You can standardize on F hoists throughout your plant because the line is as economical as it is broad: capacities–½ to 10 tons, mounting–lug, plain or geared hand trolley, 3 types of motorized trolleys. Request Bulletin 920. Hoist & Crane Division of Robbins & Myers, Inc., Springfield, Ohio or Brantford, Ontario.



Type F hoists: over forty speed load choices.

ROBBINS & MYERS

hoists & cranes, Moyno® pumps, motors, Propellair® fans

this is a Nail!

It's a special kind of nail, knurled for greater holding ability and produced by machines which not only make nails, but at the same time drive and countersink them in leather or wood at rates up to three per second.

The wire used by these nailing machines must meet critical specifications. It must be ductile enough to form a perfect head and clinch when needed, yet be hard enough to penetrate tough grains and knots. Moreover, it must be consistent in quality throughout its length.

For 26 years, PAGE has supplied wire which meets exactly the requirements of the manufacturer of these machines—The Auto-Soler Company, Atlanta, Georgia.

Regardless of *your* use of wire, you can count on PAGE uniformity. Whether you make hairpins or lock washers, PAGE wire will give you the tensile strength, ductility, finish, tolerance and other properties you require.

PAGE facilities are designed to produce a wide range of high quality manufacturers wire items—including special shapes. Where requirements are exacting, you will find PAGE wire unexcelled.

Since 1902, we have pioneered many "firsts" in the wire industry. The latest of these is corrosion-resistant ACCO *Aluminized* Wire—commercially pure aluminum bonded to a steel core.

LET'S TALK WIRE! Get in touch with us for your wire needs. Gain the benefit of PAGE experience and "wire know-how" to improve your product and lower your costs.

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PAGE MANUFACTURERS WIRE

Page Steel and Wire Division • American Chain & Cable Company, Inc.

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PAGE — *the source for answers to wire problems*

Specify SANDVIK *Precision-Tailored* Spring Steel

FOR ACCURATE FLATNESS, STRAIGHTNESS, WIDTH, GAUGE AND EDGE FINISH *PLUS* SPECIFIC PHYSICAL PROPERTIES

SS-138

When you require specific physical properties combined with accurate dimensions in spring steel, call Sandvik.

From composition, through processing to the finished strip, Sandvik has had long experience in precision-control. That is why you find Sandvik steels used for feeler gauges, watch springs, compressor valves, camera shutters, reeds, shock absorbers and many other exacting spring steel applications.

Sandvik supplies cold rolled specialty strip steels –

- **In special analyses for specific applications.**
- **Precision-rolled thicknesses to fit your requirements.**
- **In straight carbon and alloy grades.**
- **Annealed, unannealed or hardened and tempered — scaleless or polished bright, yellow or blue.**
- **With square, round or dressed edges.**

Sandvik stocks a wide variety of qualities and sizes. In addition Sandvik has Rolling, Slitting, Edge-Filing and Hardening and Tempering facilities.

NEW, FREE BROCHURE

Gives Specific Data On Sandvik Cold Rolled and Hardened and Tempered Strip Steels. Catalogs leading types by application and lists finish, usual size range and chemistry. Send for your copy today.

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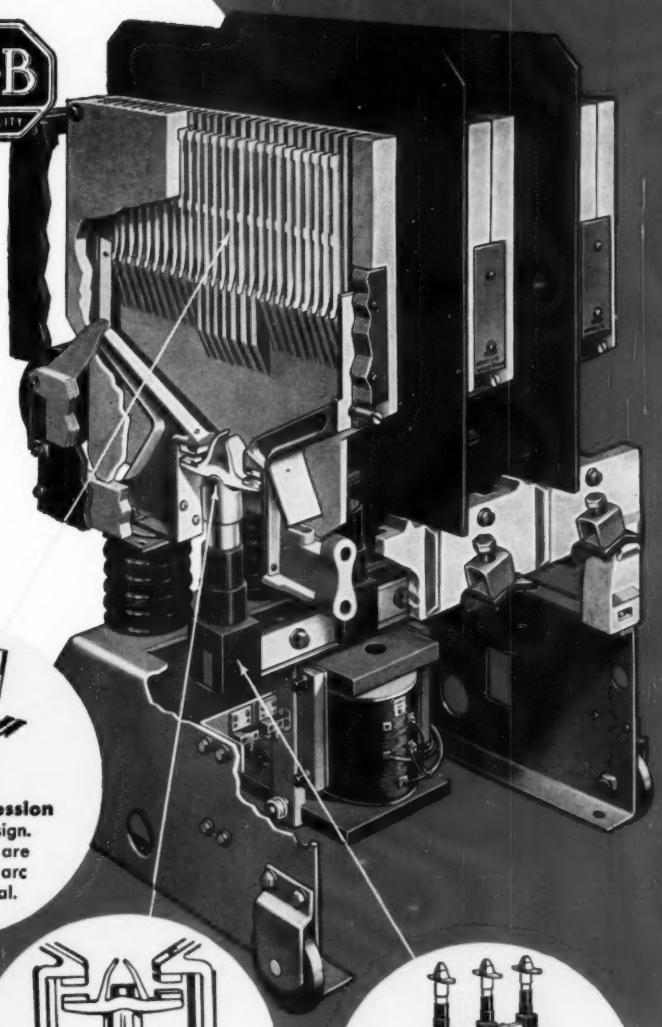
Sandvik Quality Steels

Here's the inside story of industry's

MOST RUGGED HIGH VOLTAGE SWITCH



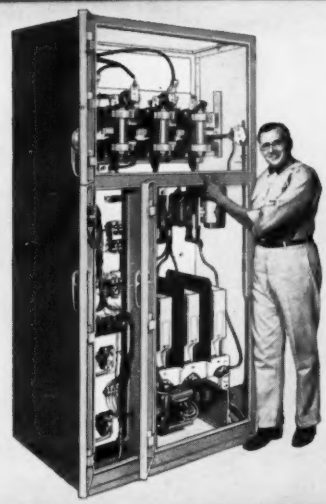
THIS SOLENOID AIR BREAK CONTACTOR IS THE HEART OF THE A-B STARTER LINE

A tremendous operating life has been built into these new A-B high voltage, air break starters by using the same simple solenoid design—with only ONE moving part—that has proved good for millions of trouble free operations in Allen-Bradley low voltage starters. A-B high voltage starters are made for all types of service and for all types of motors up to 1500 hp, 2300 v; 2500 hp, 4600 v. Send for Publication 6080, today.

Faster Arc Suppression
New blowout design. Novel arc chutes are molded from an arc resistant material.

Double Break Contacts
Silver alloy contacts never need maintenance. Vertical motion assures uniform contact pressures.

Only One Moving Part
Simple solenoid design eliminates trouble-causing pins, pivots, and flexible jumpers.



A-B High Voltage Starter with Air Break Contactor

Bulletin 1159 high voltage air break, across-the-line induction motor starter in NEMA Type 1 enclosure. All Allen-Bradley high voltage starters are equipped with current limiting fuses with interrupting capacities of 150,000 kva at 2300 v; 250,000 kva at 4600 v.

ALLEN-BRADLEY

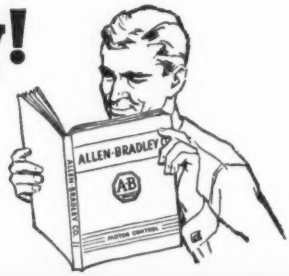
Member of NEMA

Quality Motor Control

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

Some more special controls that are "standard" with Allen-Bradley!

Even Khrushchev couldn't claim a more complete line!



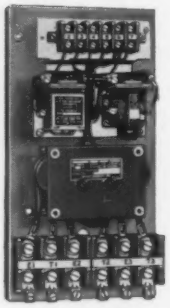
A-B QUALITY

Phase Failure Phase Reversal Relays

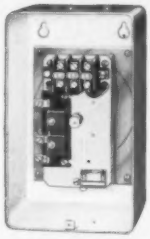
The Bulletin 812 Style RF relay responds to *all* open phase conditions on a branch motor circuit and immediately removes the motor from the line. Also, the motor is disconnected when a phase reversal occurs anywhere in the system on the line side of the relay. "Fail safe" design.

Phase Failure, Style F covers f.l. currents from 1.5 to 300 amp in 4 sizes. Coils to 600 v, 60 cycles.

Phase Reversal, Style R made with coils for 110, 208/220, 440, 550 v for either 50 or 60 cycles.



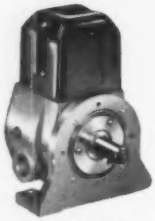
Bulletin 812 Style F



Bulletin 812 Style R

Zero Speed Switch

Used for "plugging" duty, these switches prevent coasting and bring squirrel cage motors to a sudden stop. Also used to prevent application of reverse power before motor comes to a full stop. Adjustable operating speed.

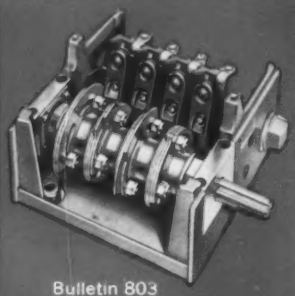


Bulletin 808

Low Pressure Switch

Especially designed for domestic water pump service and commercial air compressor service. These inexpensive compact switches offer pressure ranges from 15 to 200 psi.

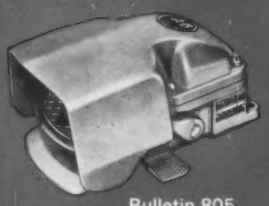
Bulletin 830



Bulletin 803

Rotating Cam Limit Switches

Heavy-duty pilot controls used on rotating machines to initiate functions at any point of rotation. Made with up to 12 individually adjustable, independent circuits.



Bulletin 805

Foot Switches

Built for toughest service. Has maintenance free, snap-action contacts. Extended base prevents tipping. Made with hood (left), with top guard and without guard.

Bulletin 836 Style T

Pressure Controls

Oiltight enclosure for machine tool hydraulic systems operating at pressures up to 5000 psi. Operating pressure and differential are adjustable. Indicator shows trip point. Silver contacts never need service attention.

Bulletin 837 Style A

Temperature Controls

Newly designed bellows provides lower differentials. Rugged construction permits continuous cycling from zero to maximum setting. Vibration or mounting angle will not affect accuracy of operation. Temperature ranges from —150°F to 490°F.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

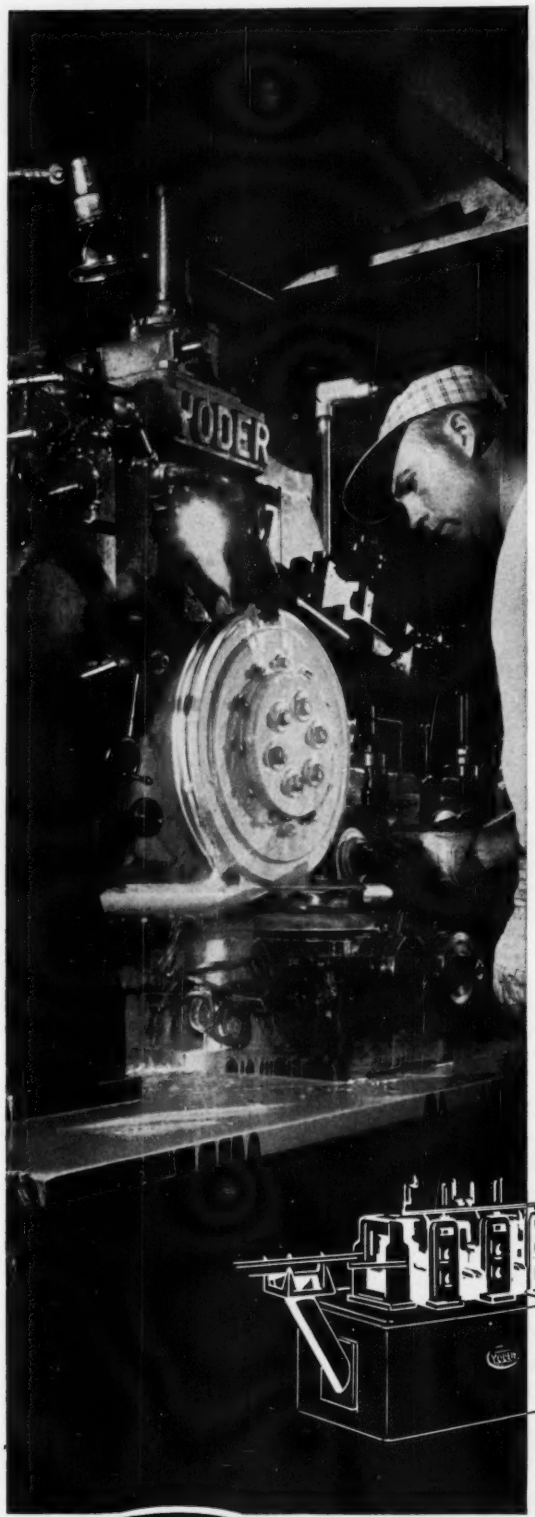
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

ALLEN-BRADLEY

Member of NEMA

Quality Motor Control

5-60-RM



Yoder Tube Mills speed tailpipe production at AP Parts Corporation

The AP Parts Corporation (Toledo, Ohio), world's largest producer of replacement mufflers and tailpipes, uses 2 YODER Tube Mills to produce more than *300* ft. of 1¾", 1⅞" and 2" tubing per minute.

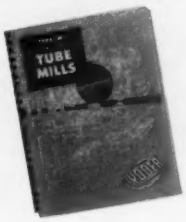
According to Mr. John Grindle, Plant Engineer, the two-man operated YODER Mills are vital to the production of the entire plant. "YODER Tube Mills earn their keep daily. They are easy to set up, maintain and operate . . . the welds are clean and uniform. We depend on them for constant quality, high production and minimum downtime".

The YODER Tube Mills at AP Parts exemplify the production economies and dependability of all YODER-built equipment, whether it be Pipe and Tube Mills, Cold Roll-Forming Machinery or Slitting Equipment.

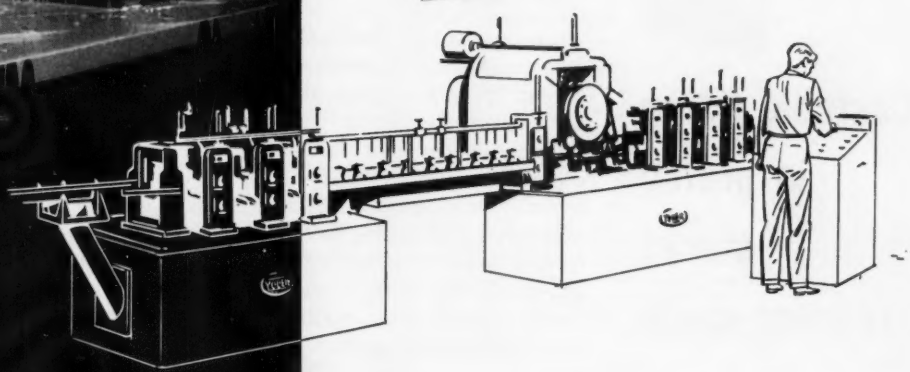
If your products require ferrous or non-ferrous pipe or tubing, from ¼" to 26" diameters, there is a YODER Mill designed to produce it economically, accurately and efficiently.

THE YODER COMPANY

5502 Walworth Avenue • • Cleveland 1, Ohio



For complete information on YODER Pipe or Tube Mills . . . write for the fully illustrated, 88 page YODER Tube Mill Book . . . it is yours for the asking.

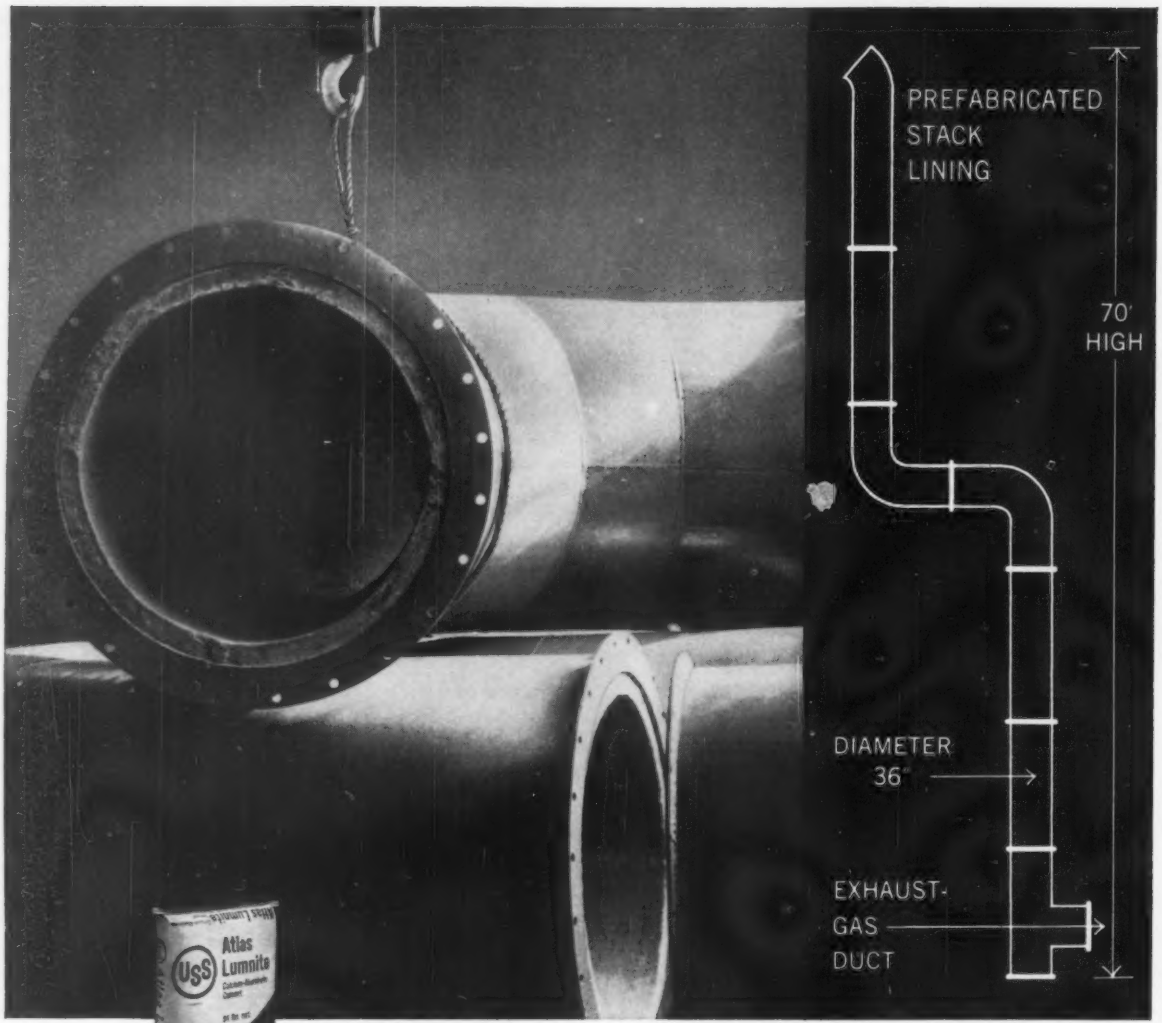


ENGINEERING **YODER** MANUFACTURING

PIPE AND TUBE MILLS (ferrous or non-ferrous)

COLD ROLL FORMING MACHINES

ROTARY SLITTING LINES



Castable-lined prefab sections of waste-gas ducts and stacks for pit annealers at United States Steel's Homestead (Pa.) Works. **Contractor:** Amsler Morton Company, Pittsburgh, Pa.

Castable lining in prefab stacks reduces costs

When unusual stack and duct layouts are necessary, prefab elbows, tees, dog-legs and straights can be pre-lined with a refractory insulating concrete at considerable savings. Using a castable refractory, bonded with LUMNITE calcium-aluminate cement, monolithic linings can be cast in place without anchors or reinforcing mesh. Since the concrete will reach service strength in 24 hours, early release and re-use of forms are possible, speeding the job. Compared to cutting and fitting small refractory units, there is less material loss. Cluttered job sites and scaffolding are eliminated. And casting indoors means no delays due to weather. Leading manufacturers of refractories offer castables bonded with LUMNITE cement for a variety of installations in metalworking. Castables are packaged mixtures, ready to use. Simply add water, mix and place. For details, write Universal Atlas Cement, 100 Park Avenue, New York 17, N. Y.

L-202

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Universal Atlas Cement
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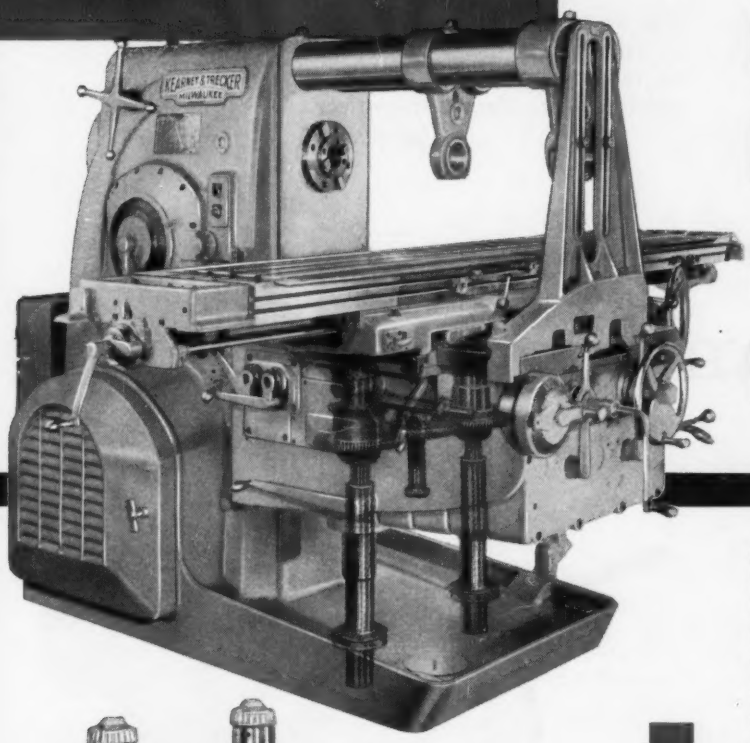
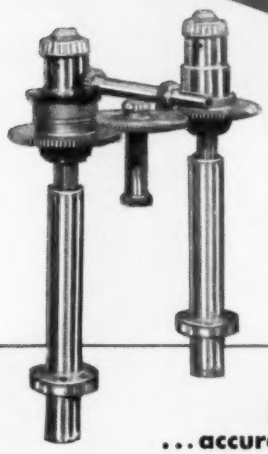
HEAVY-DUTY TF SERIES

Heaviest cuts, highest accuracy through balanced design





EXCLUSIVE twin elevating screws

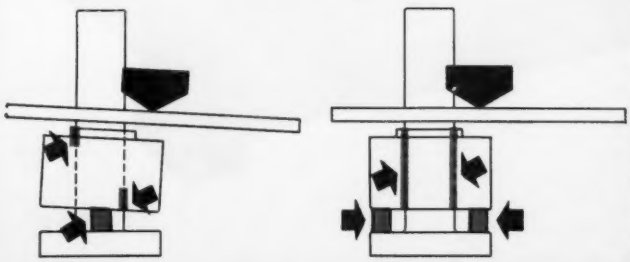
Three large, precision-hobbed, equidiameter plate gears provide simple, maintenance-free power transmission to both elevating screws. This positive and accurate drive maintains perfect synchronization of elevating screws.

DEFLECTION REDUCED ...accuracy increased 3 times over single screw design

Conventional Single Screw Design—color indicates shorter length of contact between knee and column ways when heavy work load is off-center. The result is table deflection, strain on screw and excessive uneven wear on ways.

New *TF* Twin Screw Design—color indicates no change in contact between knee and column ways with heavy work load off-center.

Result: maximum rigidity and accuracy with minimum wear on screws and ways.



KEARNEY & TRECKER *TF* SERIES MILLING MACHINES — WITH *BALANCED-ACTION* TWIN SCREW KNEE SUPPORT — INSURES RIGIDITY WHERE IT COUNTS

The twin screw knee support is just one of the many superior design features of the Kearney & Trecker *TF* Series heavy-duty, knee-type milling machines... unequaled in their class for rigidity and long-lived accuracy.

Other important features of the *balanced design TF* Series that add up to maximum rigidity and accuracy include — massive column with solid, extra-wide, full-length way — one-piece knee with wider and longer ways — increased bearing area between solid cast table and saddle — double "Vibra-Void" overarms on plain and universal models — perfectly balanced three-bearing spindle — and many other engineering achievements that make these "mills" a *best buy* for versatile heavy-duty machining.

Choose from 48 models in plain, universal and vertical styles in size Nos. 2, 3, 4, 5 and 6 with 10 to 50 hp.

FOR THE WHOLE STORY . . .
call your local Kearney & Trecker representative or write today for Bulletin TF-58 . . . 54 pages packed with eye-opening facts and complete specifications. Check the complete Kearney & Trecker line before buying any "mill."

KEARNEY & TRECKER MILWAUKEE

KEARNEY & TRECKER CORP.
6800 W. National Ave. • Milwaukee 14, Wis.
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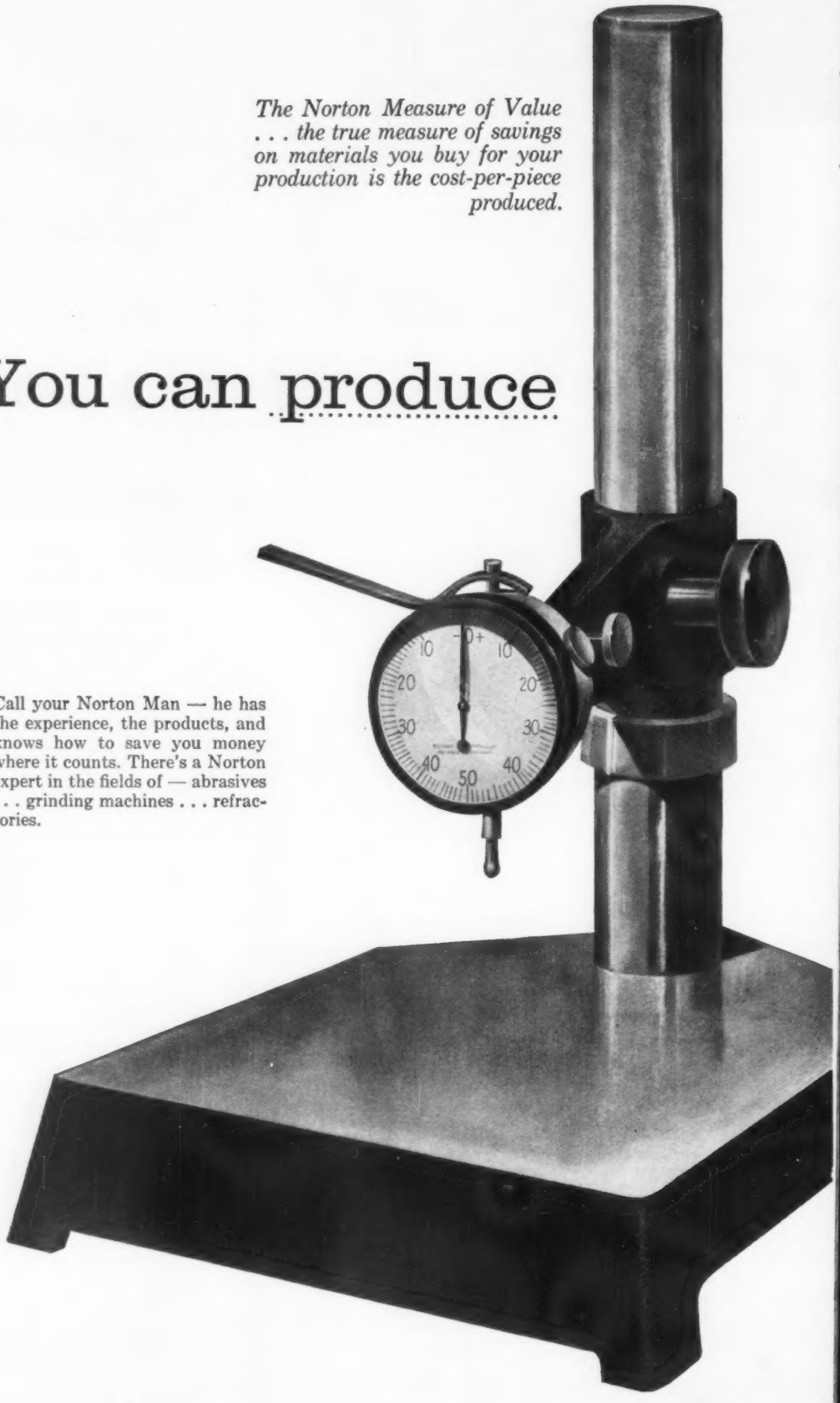
The Norton Measure of Value . . . the true measure of savings on materials you buy for your production is the cost-per-piece produced.

You can produce

Call your Norton Man — he has the experience, the products, and knows how to save you money where it counts. There's a Norton expert in the fields of — abrasives . . . grinding machines . . . refractories.



greater savings than you can buy

You can't recognize a value by its price alone. This is true of all types of grinding wheels and has special significance in diamond wheels in view of their high initial cost.

The price tag on a diamond grinding wheel may appear to be a good "buy", but the real consideration should be what will you get for your money?

Diamond wheels less expensive than Norton may save you money on immediate cost. But if the lower cost wheels do not perform their jobs efficiently or cause production delays because of poor quality or wheel misapplication — the price you paid is too much.

The only accurate measure of the value of any grinding wheel is how much it produces for you per dollar cost — not merely how much you paid for it. Here is why Norton diamond grinding wheels are worth more to you . . .

Norton Company introduced all three diamond wheel bond types — does all its own sizing and checking of diamonds — duplicates wheel specifications with constant accuracy. Whether the diamonds you use in carbide grinding are mined or man-made, Norton gives you the most advanced research engineering and manufacturing facilities in the entire abrasive field. And you get this great scope of detailed knowledge on a personal basis — your Norton Man.

Your Norton Man starts his career by spending a minimum of one year in a carefully planned training course in the Norton plant and a comparable period of training in the field. The Norton Man has an average of 15 years' abrasive experience in addition to the specialized training. He is the most knowledgeable man in abrasives that you can consult. Make him your consulting abrasive engineer.

Ask him to make an Abrasive Requirement Study for you. This study lists the correct specifications for each abrasive job in your plant to assure you lowest cost-per-piece produced. He is also available for complete field testing on specific problems. For example . . .

Your Norton Man can increase production by pointing out ways for effective wheel usage. He has the widest selection of grinding wheels in the industry from which to select the best wheel for new product grinding operations and for improving your current grinding jobs — both at the lowest cost. And with Norton grinding wheels you can be sure of precise duplication order after order.

Norton offers true abrasive economy. Economy that pays off in lower cost-per-piece produced. Call your Norton Man. NORTON COMPANY, General Offices, Worcester 6, Mass.

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NORTON
ABRASIVES

75 years of... **Making better products...to make your products better**

Ajax Magnethermic supplies all types of Induction Melting Furnaces including: core, coreless, lift and automatic pouring. Vacuum melting and degassing applications are among their many uses. 60 cycle, motor generator, mercury arc converters, R. F. generators and the new 180 cycle Multiductor, all products of AM, are available as the power source.

THE NEW NAME WITH THE FAMILIAR RING!

Induction Melting Furnaces from 8 ozs. to 8 tons capacity,
one of many product lines of AM,
pioneer builder of induction heating equipment since 1920.

"induction heating is our only business"

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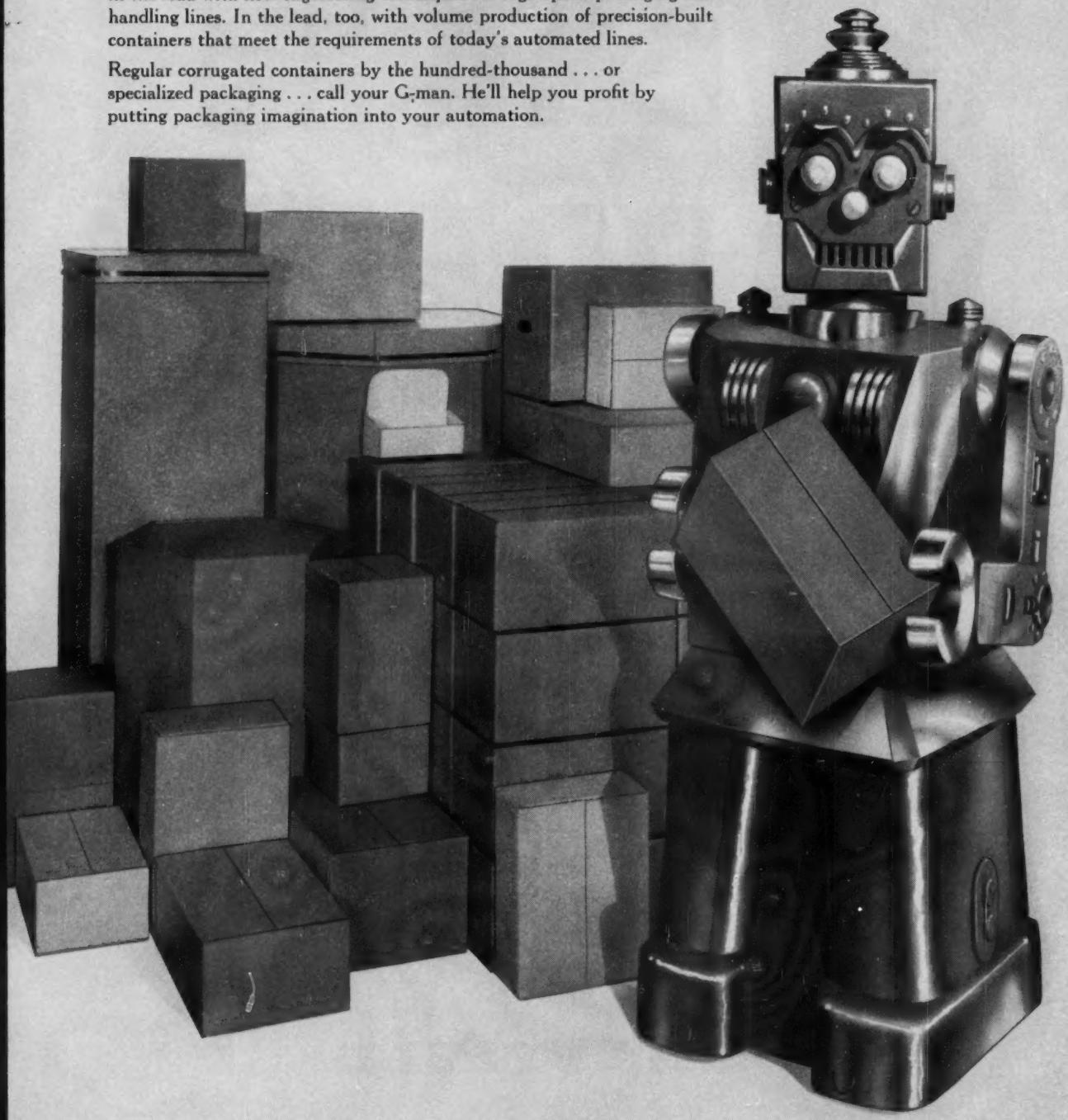
GAYLORD PUTS IMAGINATION INTO YOUR AUTOMATION

Not ready for robots? Fast-moving progress in automation can out-date your packaging operations in just a few years. That's why you'll find Gaylord in the lead with new engineering techniques for high-speed packaging and handling lines. In the lead, too, with volume production of precision-built containers that meet the requirements of today's automated lines.

Regular corrugated containers by the hundred-thousand . . . or specialized packaging . . . call your G-man. He'll help you profit by putting packaging imagination into your automation.



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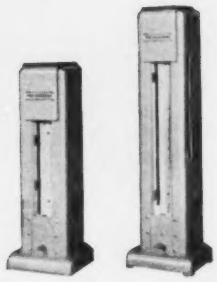
GAYLORD CONTAINER DIVISION

Gaylord Boxes

IN CANADA • CROWN ZELLERBACH CANADA, LTD. VANCOUVER, B. C.

HEADQUARTERS, ST. LOUIS
PLANTS COAST TO COAST

5 YEAR WARRANTY



The Sheffield Corporation offers a 5 Year Quality and Reliability Warranty on Precisionaire Column Instruments now being shipped with Sheffield gaging tooling.

The Warranty is clear and positive, as reliable as the performance of the Precisionaire Column Instrument which it stands behind.

Precisionaire Column Instruments have performed so well over a 20 year period that Sheffield can make this important assurance of reliability – *at no extra cost.*

Sheffield Precisionaire Column Instruments are the most versatile and trouble-free air gages you can buy.

For reliable air gaging, specify Sheffield. Ask your Sheffield representative for details about this Warranty.

The
SHEFFIELD
Corporation *Dayton 1, Ohio*

A subsidiary of the Bendix Aviation Corporation

Gages, Measuring Instruments, Automatic Gaging & Assembly Systems • Machine Tools • Contract Mfg.

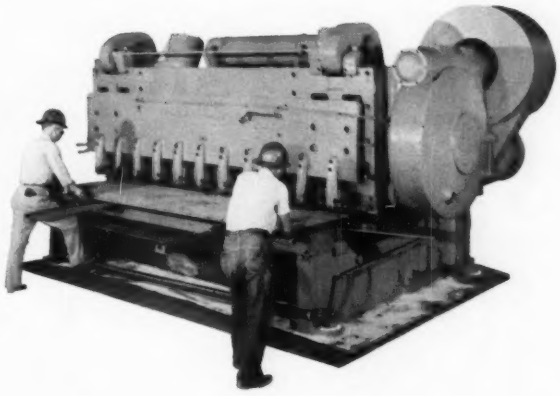
One steel "SANDWICH" coming up

A typical example of Ingersoll versatility in fine quality specialty steels

For a wide variety of product applications, Ingersoll produces specialty steels made up of composite layers. These include Ingersoll's famous IngAclad stainless-clad steel, soft center steel, and 2-ply knife steel—all widely used in industry.

To make such sandwich-type steels properly calls for special experience and skill, special care and handling from melting to rolling to shearing and blanking. But that's typical of *all* the specialty steels Ingersoll makes—where fine quality is the standard at every step of the way to make sure the steel you get meets your exact specifications.

And that's the best reason of all why Ingersoll Steel is such a good name to know, a good place to go for the specialty steels you need. Try us—we think you'll agree.



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SAW STEELS • HIGH SPEED POWER AND HAND HACK SAW STEELS • KNIFE STEELS • STAINLESS STEELS • HEAT RESISTING STEELS • INGACLAD STAINLESS-CLAD STEEL SHEETS • CROSS ROLLED STEELS • CARBON ELECTRIC STEELS FOR AUTOMOTIVE, TRACTOR, AND OFF-HIGHWAY EQUIPMENT CLUTCH DISCS AND CLUTCH STEERING RINGS • ALLOY STEELS • ULTRA HIGH STRENGTH STEELS • SOFT CENTER AND OTHER AGRICULTURAL STEELS • FORGING QUALITY ELECTRIC FURNACE INGOTS TO 23,000 POUNDS

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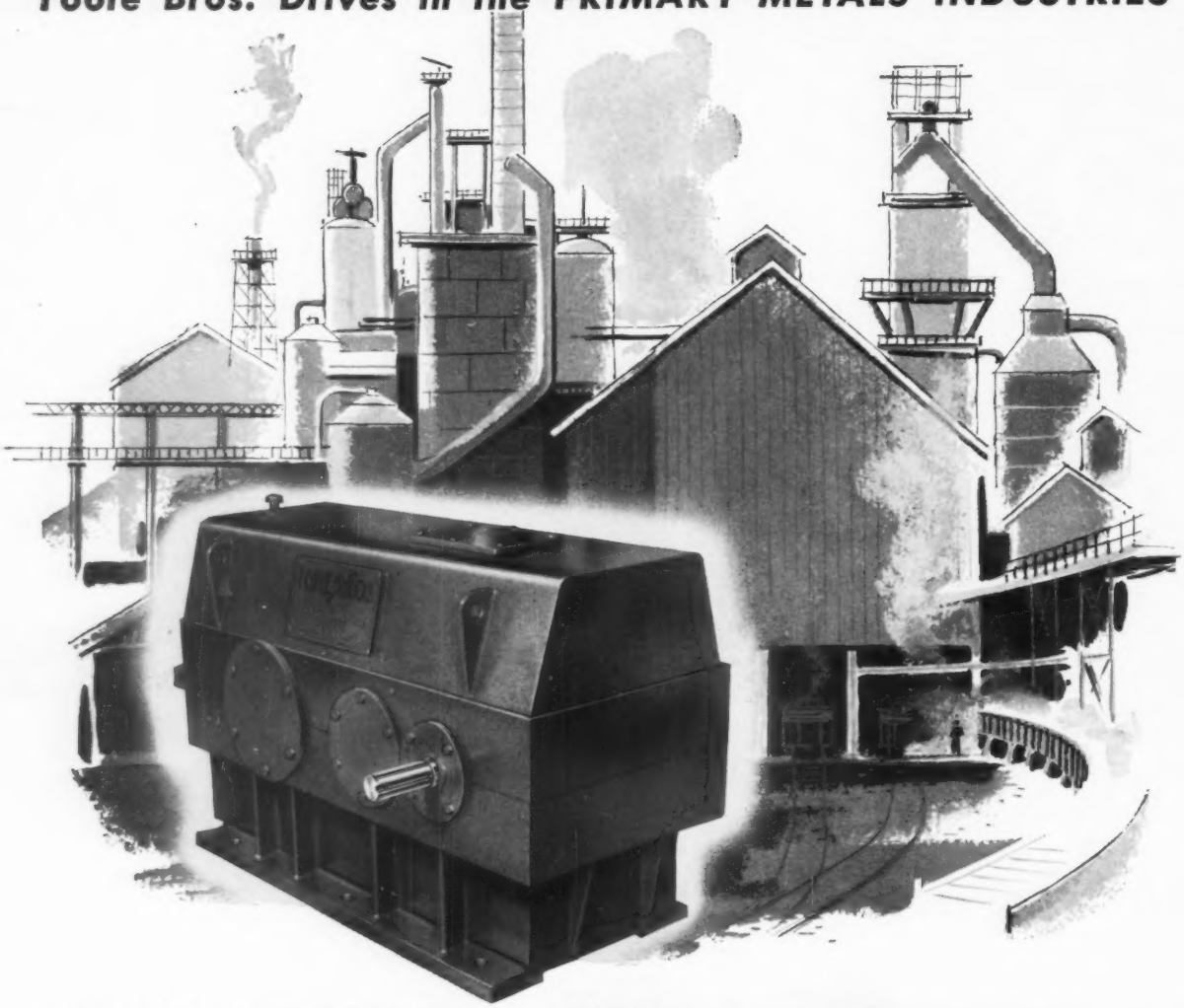
Borg-Warner Corporation • NEW CASTLE, INDIANA

Foote Bros. Drives in the PRIMARY METALS INDUSTRIES



ALL STEEL *Maxi-Power...*

maximum performance drive in a tough steel housing

Add a functionally designed and carefully engineered, high strength fabricated steel housing to the basic heavy duty Maxi-Power Parallel Shaft Helical Gear Drive components, and you get a unit that is capable of resisting severe external impact, in addition to delivering maximum performance.

Maxi-Power Drives are found in the Primary Metals Industries wherever power demands are heavy, and operating conditions require the ultimate in strength, stamina and efficiency.

The heavy, precision machined steel bed of these drives keeps broad faced helical gearing in precise alignment to provide a smooth, overlapping mesh with close backlash tolerances. Tooth deflection is uniform under the heaviest loads. Heavy duty anti-friction bearings are conservatively rated to handle severest shock loads.

Maxi-Power Drives are available in nine combinations of shaft assemblies to permit a variety of gear drive arrangements between the prime mover and driven equipment. Maxi-Power Drives are available in Single, Double, and Triple Reductions. Standard Ratios are from 2.08 to 1 and up to 360 to 1. Capacities to 1550 HP.

Why not get the complete story on Maxi-Power soon? Write for Engineering Manual MPB and full details on the All Steel Drive today.

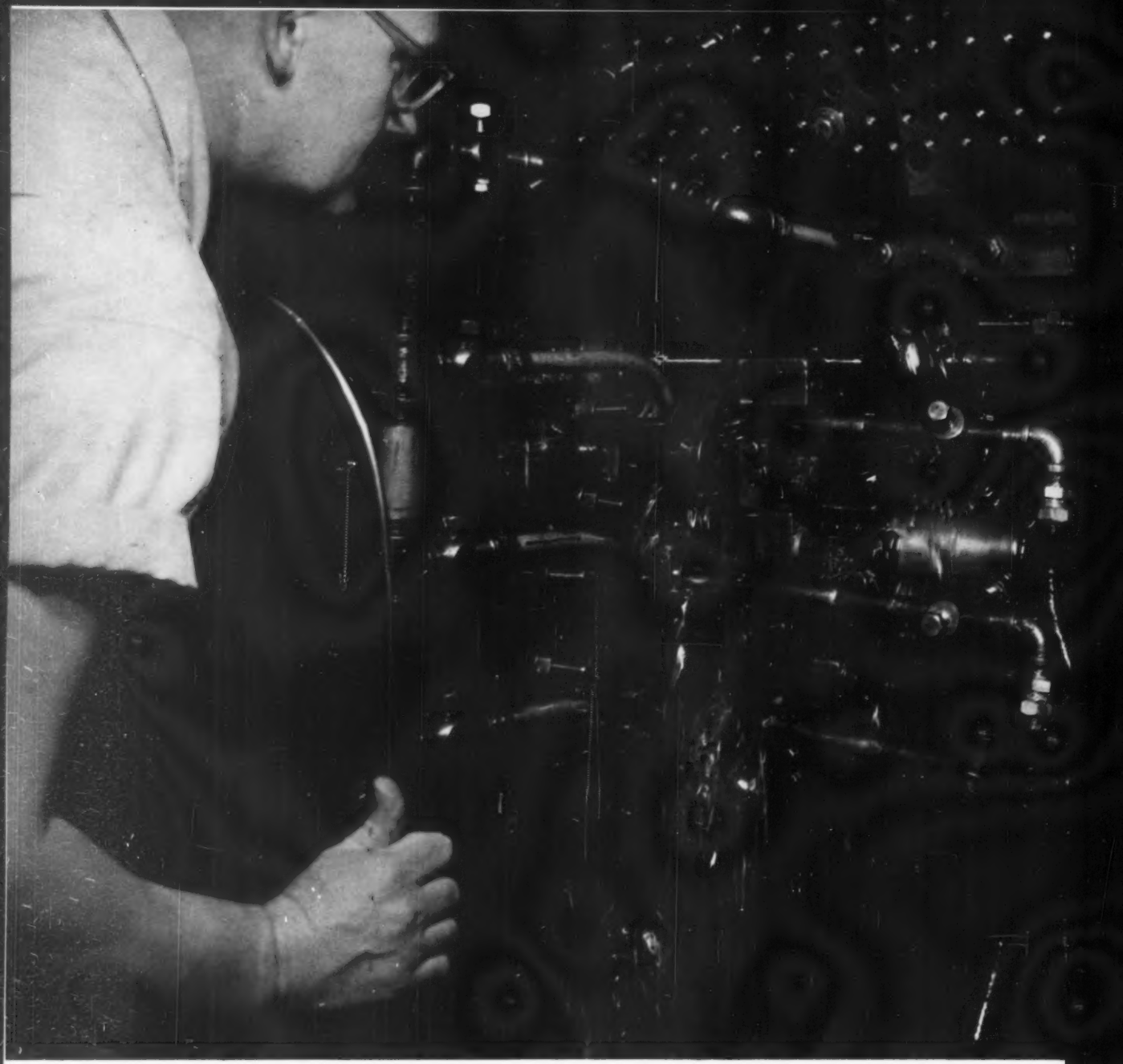
FOOTE BROS. F B **GEAR AND MACHINE CORPORATION**

4583 South Western Boulevard, Chicago 9, Illinois

POWER TRANSMISSION DRIVES

UNLIMITED MOUNTING POSITIONS

... HEAT-TREATING - 1965 ...
CAMBRIDGE METAL-MESH BELTS are the answer to the big problems you'll face in the competitive '60's—tighter operating costs, higher production and consistent quality.
Continuous movement of products through heat-treating operations, as well as quenching, washing and drying, speeds up production and cuts costly manual handling.
Heat, liquids or gases flow through the belt and around the product for fast, thorough processing... assuring uniformly high quality.
Superior belt design and manufacturing techniques mean longer belt life, fewer repairs, lower operating costs.
Belts can be made heatproof or acidproof—in any mesh, weave, metal or alloy—with any side or surface attachments.
Call your Cambridge Field Engineer now. He'll be glad to discuss any aspect of Cambridge Belts—from manufacture to installation and service. Look in the yellow pages under "Belting, Mechanical". Or, write for FREE 130-PAGE REFERENCE MANUAL.
CONVEYOR BELTS
The Cambridge Wire Cloth Co.
Department J • Cambridge 3, Md.
Manufacturers of Wire Cloth, Metal-Mesh Conveyor Belts, Wire Cloth Fabrications



G.E. turns motor shafts to close tolerances, cuts operating

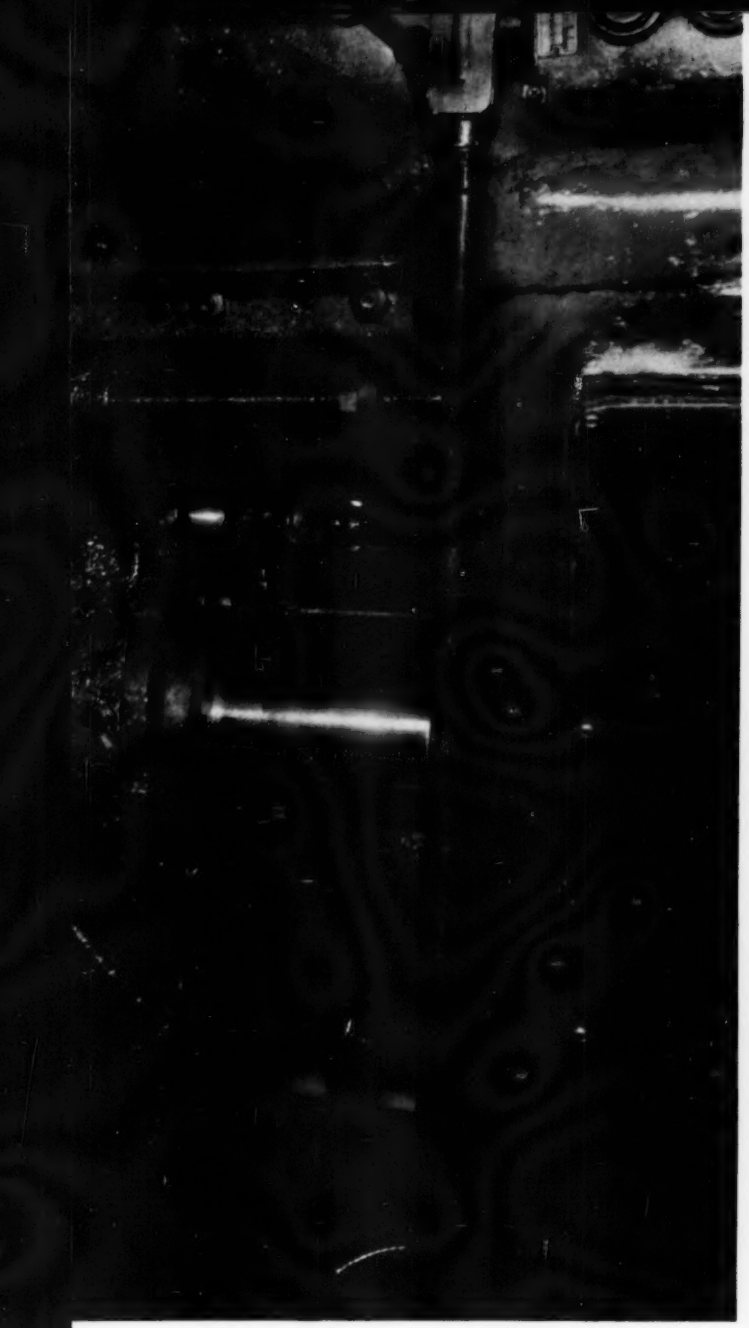
GULF MAKES THINGS

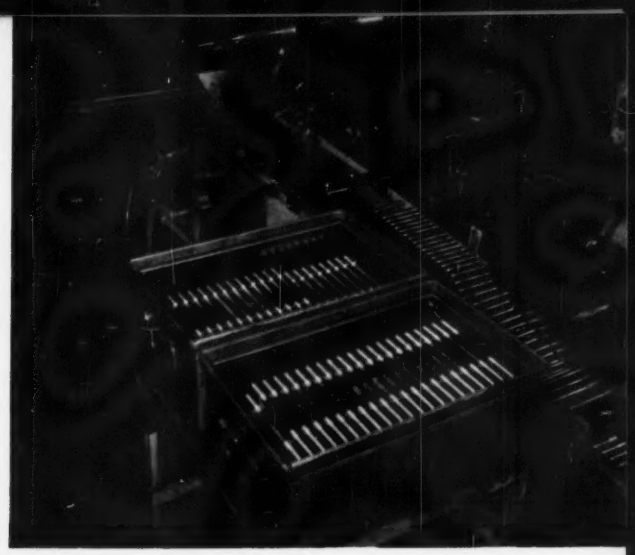
A dual purpose Gulfcut oil has enabled General Electric to achieve significant operating economies without sacrifice of machine speed or performance.

Gulfcut 41B—a sulfo-chlorinated-lard oil—is used by G.E. as the cutting fluid in their Conomatic bar machines, for machining four different sizes of motor shafts. Turned from C1212 steel at a spindle speed of 112 rpm, these motor shafts must be held to close tolerances to meet the company's high standards of product quality. G.E. reports that with Gulfcut oil they not only maintain exacting tolerances, but also get fine finishes and longer tool life.

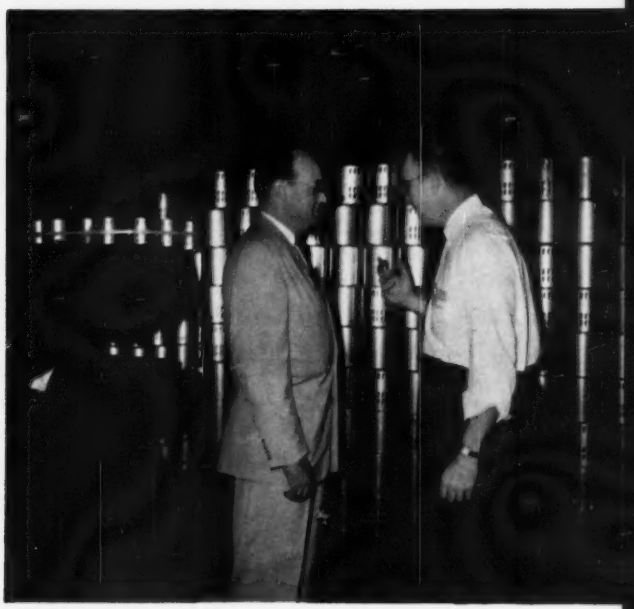
In addition, G.E. gets effective lubrication of the headstocks and other parts of their 8-spindle Conomatics with Gulfcut 41B—a truly versatile oil.

Whatever the type of machining you do, there's an oil in the complete Gulfcut line to meet your every need. Call a Gulf Sales Engineer at your nearest Gulf office, or send for your free copy of "Metal Machining with Cutting Fluids," 116 pages on their selection and use.





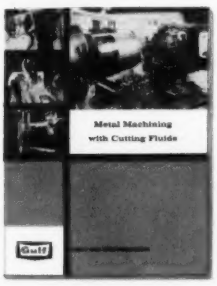
Gulfcut oil enables 8-spindle Conomatics at General Electric, Linton, Indiana, to cut motor shafts to fine tolerances; helps give them precision finishes.



Carl B. Beyerlein (right), supervisor of planning, G.E., Linton, Indiana, discusses machining problems with M. S. Ringo, Gulf Sales Engineer.

costs with Gulfcut®...

RUN BETTER!



NEW 116 PAGE MANUAL tells all about cutting oil selection and usage. Send for free copy of "Metal Machining with Cutting Fluids."

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

☐ Send literature on Gulfcut oils.
☐ Send copy of 116-page manual, "Metal Machining with Cutting Fluids."

Name_____
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SP9778

AND MARKETABILITY...

Build Your Product With

ZINC DIE CASTINGS

Out of the myriad materials available, this manufacturer used zinc die castings in their wall can opener because they:
The Rival Manufacturing Co.'s, "Can-O-Mat" and its four components die cast in zinc at right.

These advantages enabled the manufacturer to market the opener successfully in a highly competitive field where style, flawless finish and moderate cost are prime requisites.

Industry's preference for zinc as a base for die castings is indicated by the fact that, normally, zinc alloys account for about two-thirds by weight of all die castings used annually. This is due to ease of casting and finishing, excellent physical properties, close dimensional tolerances and the wide variety of beautiful finishes which can only be attained with die castings based on 99.99+% zinc.

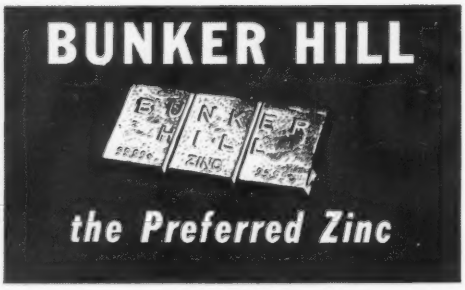
Die Casting is the Process...Zinc the Metal...

BUNKER HILL 99.99+% ZINC

EASTERN SALES AGENTS
ST. JOSEPH LEAD COMPANY, 250 PARK AVENUE, NEW YORK 17

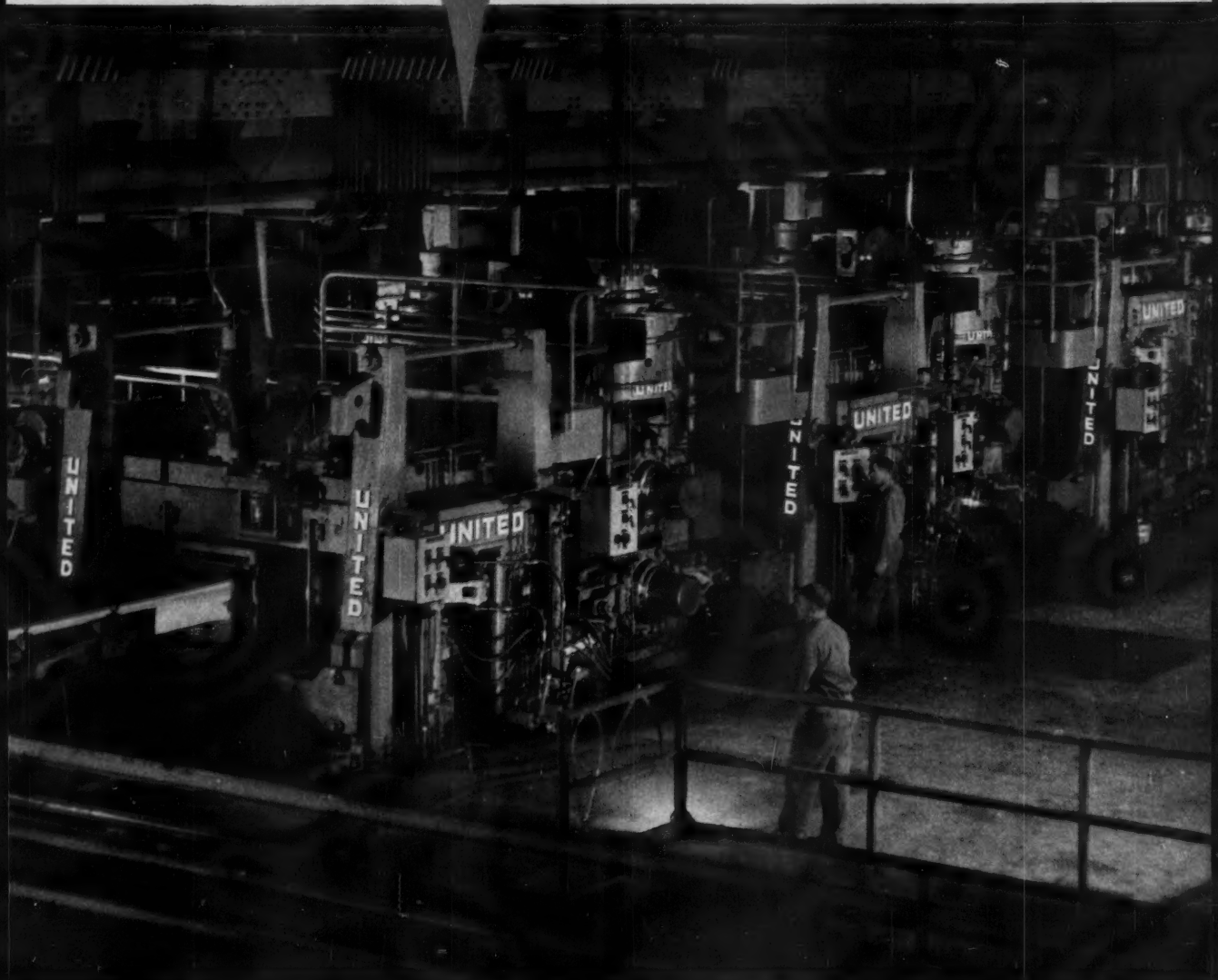
SALES OFFICE FOR PACIFIC COAST
THE BUNKER HILL CO., 660 MARKET ST., SAN FRANCISCO, CALIF.

ZN-147



UNITED®

6–Stand continuous horizontal and vertical Billet Mill

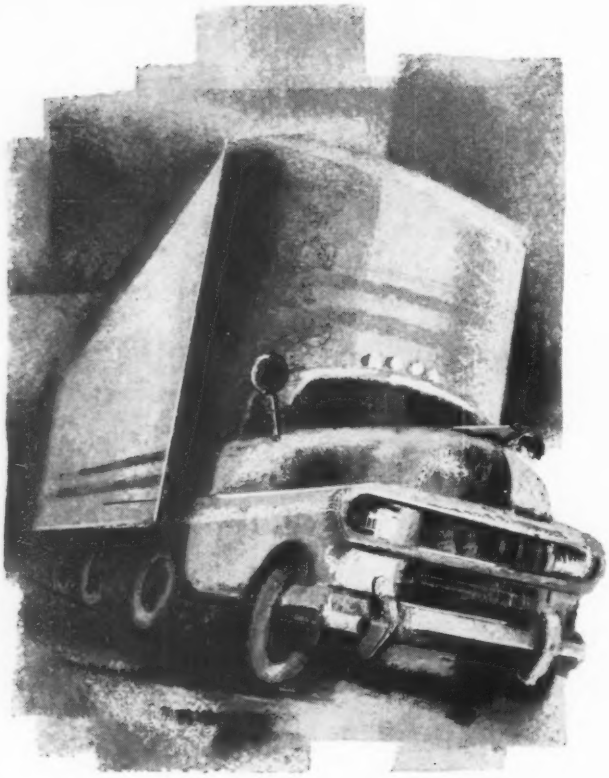


UNITED ENGINEERING AND FOUNDRY COMPANY
PITTSBURGH, PENNSYLVANIA

Plants at Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington

SUBSIDIARIES: Adamson United Company, Akron, Ohio; Stedman Foundry and Machine Co., Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.



New steels are born at Armco

from trucks to trikes . . .

Sheffield has the right bolts

Wherever wheels turn and people and cargoes travel, bolts are a necessary part of the picture. Remove all the bolts and civilization would fall apart.

Granted the importance of bolts, the next consideration is quality. You can be sure of this with Sheffield bolts. They're Sheffield-made and quality-controlled from furnace to finished product, in one of the world's largest bolt plants.

What's more, you can be sure of fast shipment of Sheffield bolts, in any type or size, in any quantity. Standard or special bolts, or bolt products custom-made to your specifications.

You name the need. Sheffield has the bolt. Get in touch with your Sheffield Man.

SHEFFIELD
ARMCO

BOLT PRODUCTS

SHEFFIELD DIVISION

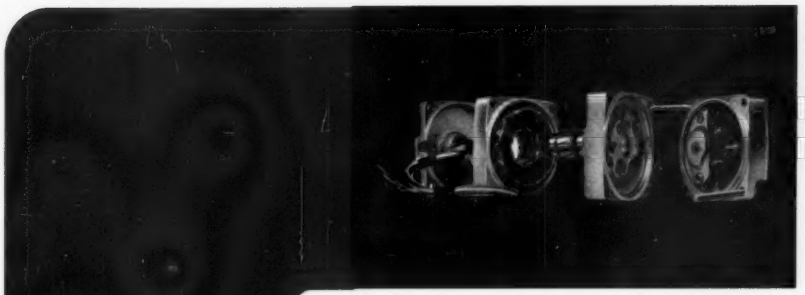
Sheffield Plants in Kansas City, Tulsa and Houston

ARMCO

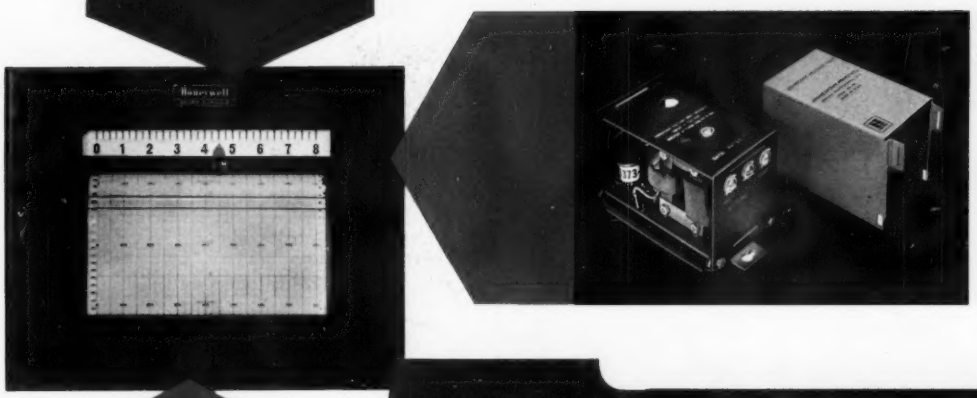
ARMCO STEEL CORPORATION

OTHER DIVISIONS AND SUBSIDIARIES: Armco Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

MODULAR DESIGN MAKES 1960 *Electronik* POTENTIOMETERS A GREATER VALUE THAN EVER



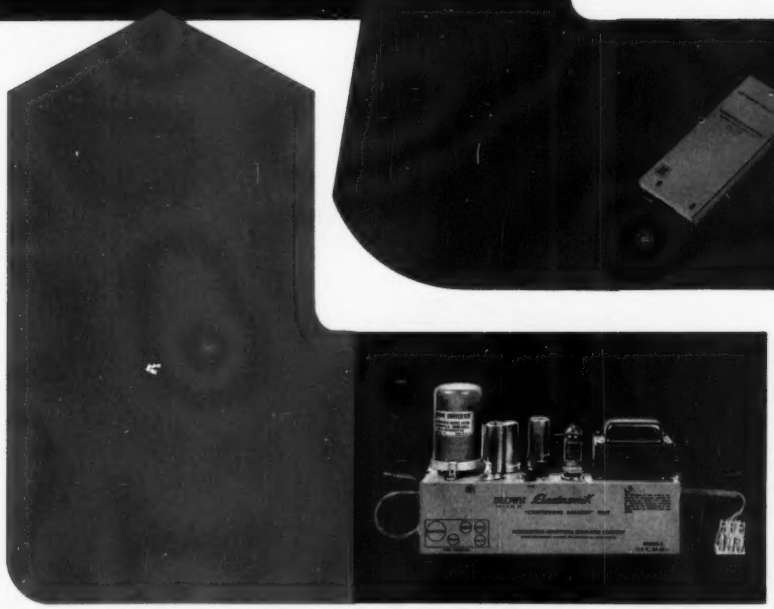
BALANCING AND CHART DRIVE MOTORS are sectionalized. Service is simplified because any major part can be replaced in a matter of seconds.



CONSTANT VOLTAGE UNIT* eliminates need for batteries, standard cells, and standardizing mechanisms . . . insuring long life.

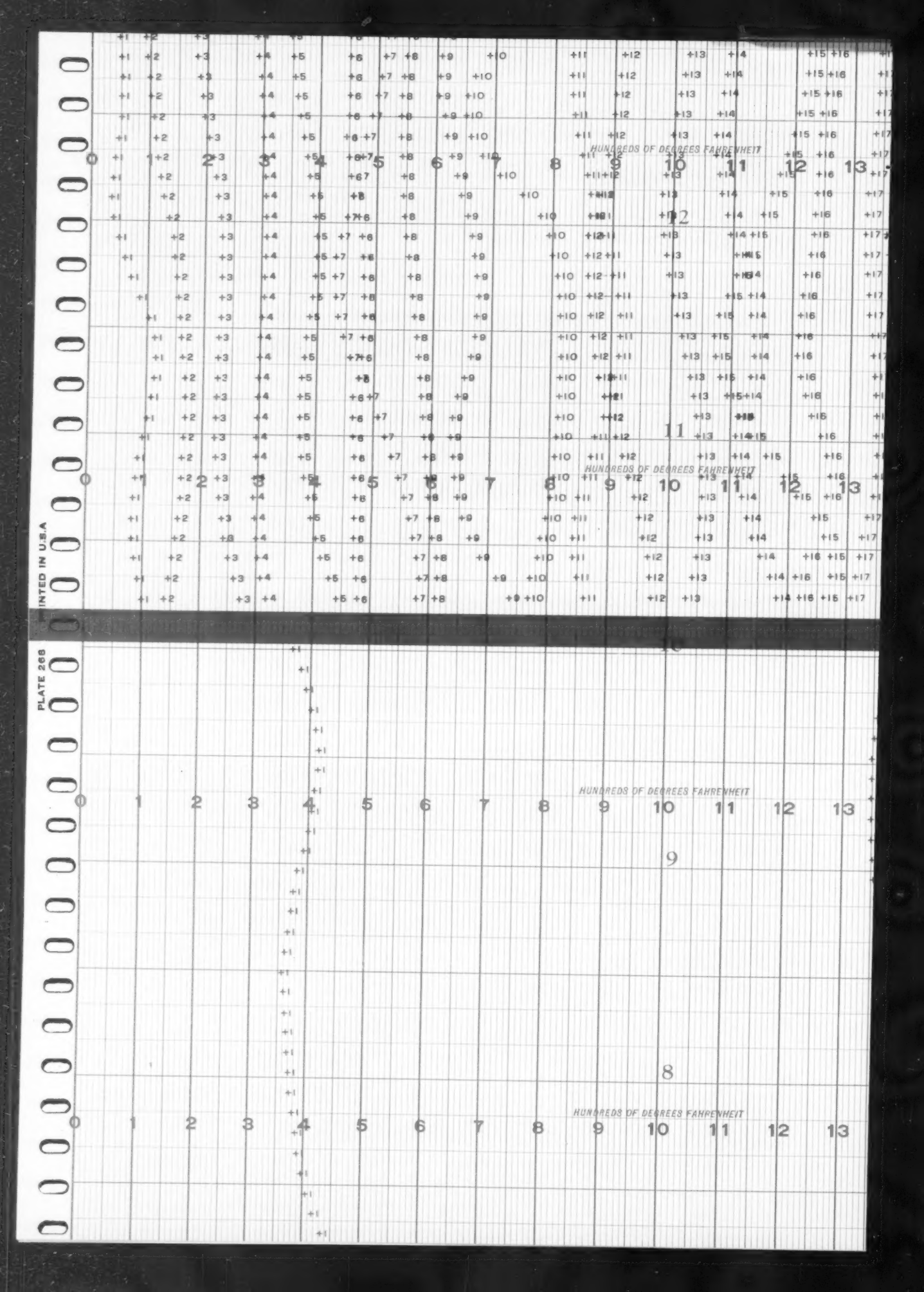
*Zener Diode

COMPARTMENTED MEASURING CIRCUIT UNIT makes range changing easy. Change one screw on a clip connected card of fixed resistors, and the job is done in a matter of seconds.



QUICK-CONNECT AMPLIFIER is easily removed from the instrument by means of a polarized plug.

BUT THIS IS JUST PART OF THE STORY OF THE 1960 LINE OF ELECTRONIK POTENTIOMETERS. LOOK AT THE DRASTIC CHANGES IN THE ELECTRONIK MULTI-RECORD RECORDERS.


HUNDREDS OF DEGREES FAHRENHEIT
HUNDREDS OF DEGREES FAHRENHEIT
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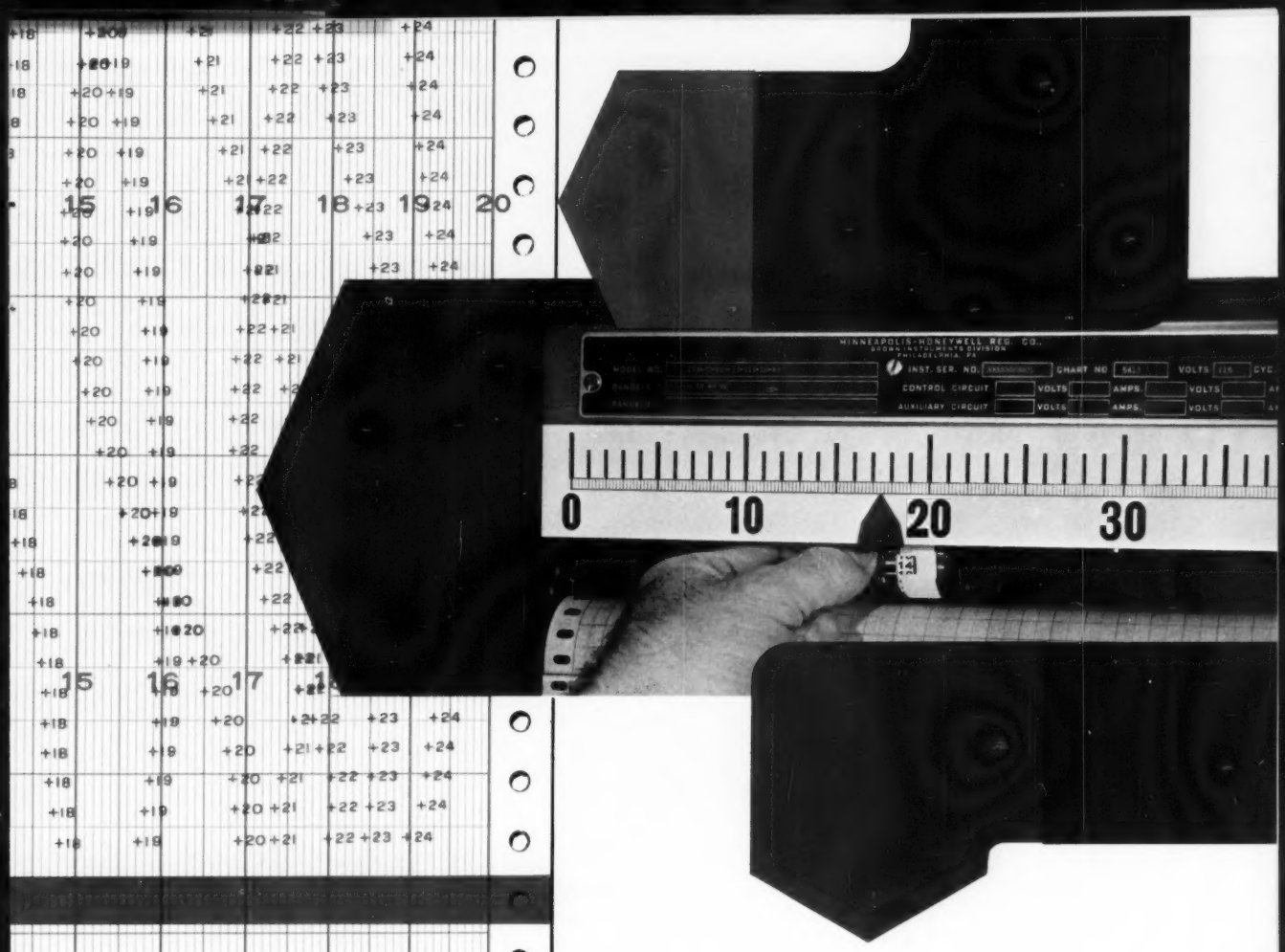
HUNDREDS OF DEGREES FAHRENHEIT
PLATE 268
PRINTED IN U.S.A.



Record 2 to 24 points on one instrument with new UNIVERSAL *ElectroniK*

MULTI-RECORD INSTRUMENT

Now, you can record 2,3,4,6,8,10,12,16,20, or 24 points on one ElectroniK Multi-Record Instrument... and change the number of points to be recorded in a matter of seconds. It's easy as this: remove a thumb-tight nut and slip off old print wheel . . . and indicator dial. Slip on a new wheel and dial: Replace nut. Plug in the number of points desired, and the job is done.

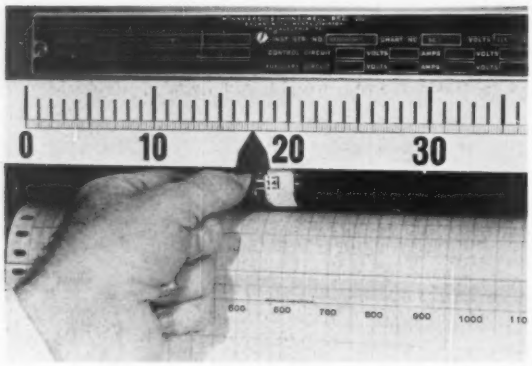
The universal features and modular design of the 1960 line of ElectroniK potentiometers are standard on all multi-record non-control models. Range and compensation changes are quick and easy, too . . . just change the cards.

FROM HONEYWELL... A DIAMOND JUBILEE PARADE OF PRODUCTS

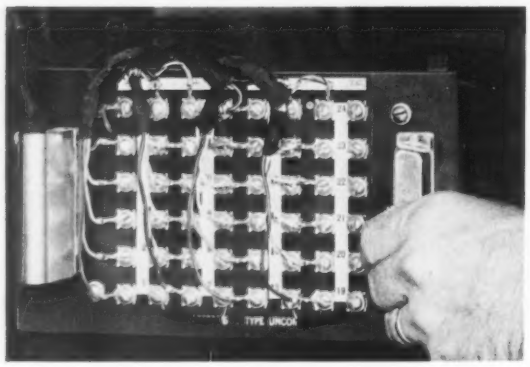
SEE HOW EASY THE 1960 ELECTRONIK MULTI-POINT RECORDERS ARE TO USE...

all it takes with the 1960 *ElectroniK* MULTI-RECORD RECORDERS to change . . .

. . . number of points recorded



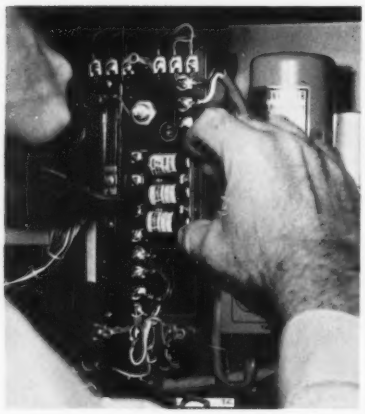
First: remove thumb-tight nut; slip off print wheel and indicator dial. Slip on new wheel and dial and replace nut.

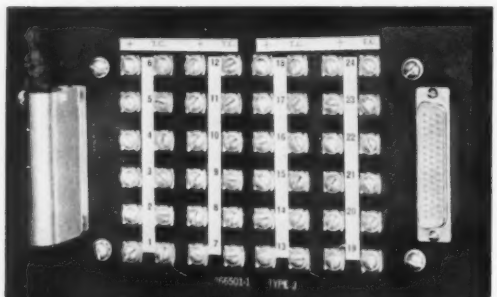


Second: replace one plug-in unit and the instrument is ready to record a different number of points.

The new flexibility and convenience of the 1960 ElectroniK Multi-Record Recorders should interest you. This new design has resulted in substantial manufacturing cost reductions which are reflected in our new price structure. Your nearby Honeywell field engineer has the full details. He's as near as your telephone. Minneapolis-Honeywell, Wayne and Windrim Avenues, Philadelphia 44, Pa.

. . . RANGE—Loosen screws and slide out the range resistor card. Replace with a different card, tighten screws and the job is done quickly and easily.





. . . COMPENSATION—The input terminal board with built-in reference junction comes out by removing one plug. Slide in the new board, replace the screws and plug and the compensation is changed.

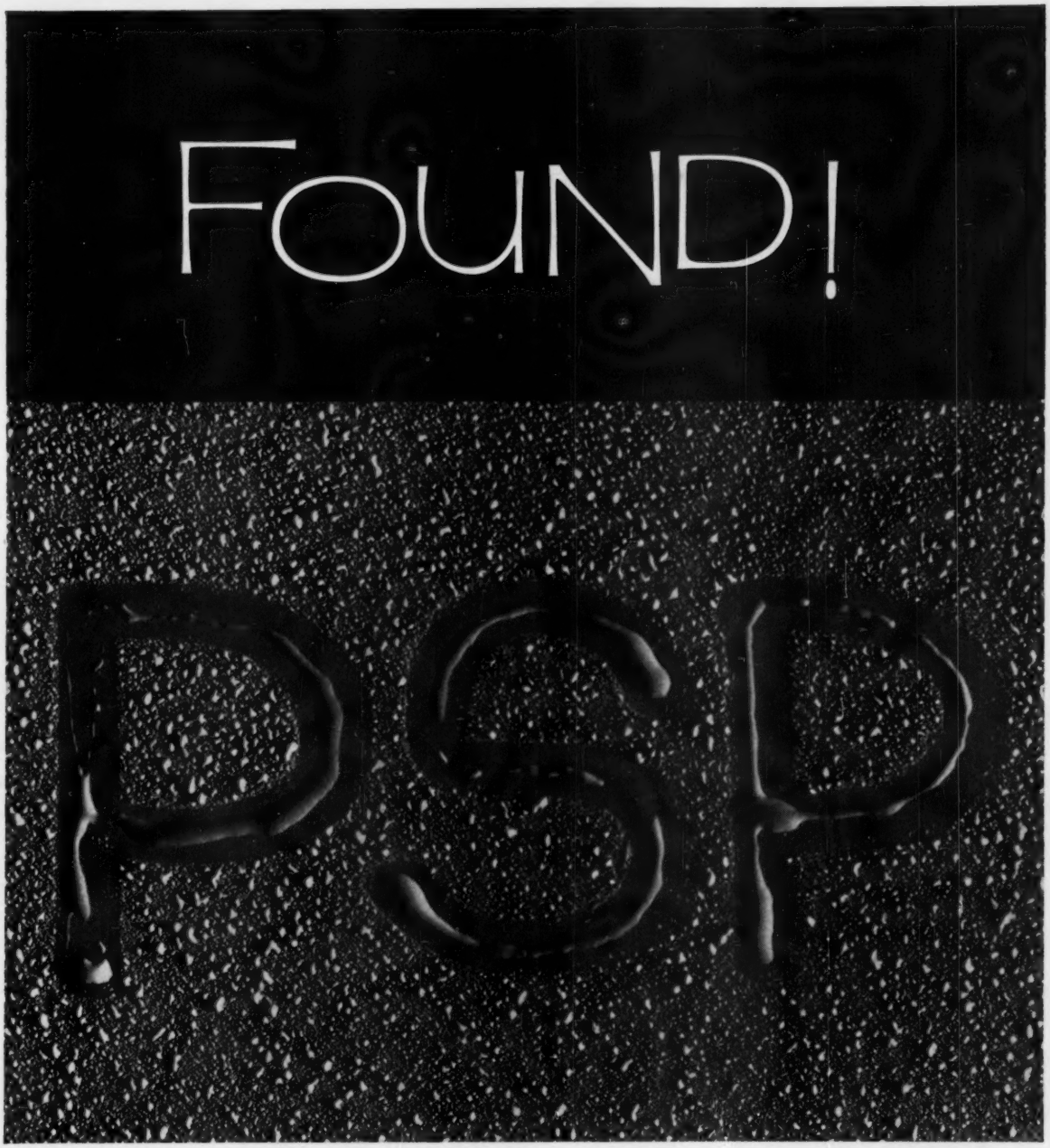
Honeywell

First in Control

SINCE 1885

75th YEAR

PIONEERING THE FUTURE



A WAY TO DEGREASE MORE PARTS PER DOLLAR OF CLEANING COST

What makes the big difference in vapor-degreasing cost?

It's not what you pay for solvent. It's how long your solvent keeps working between degreaser cleanouts.

WHAT'S PSP? It means "permanent staying power." It's what you get with Nialk TRICHLOR. The stabilizer in this solvent doesn't wear out. You don't need to add fresh stabilizer when you degrease with Nialk TRICHLOR. You don't have to check the pH. The stabilizer stays with the solvent and keeps on protecting it. In the bath. In the vapor. Even after repeated distillation.

WHY IS PSP IMPORTANT? Users report substantial savings with this better, more stable trichlorethylene. Degreasers run without shutdown for weeks—even months longer between cleanouts, in many cases. Rejects are down sharply. Less solvent is needed, because less goes down the drain in unnecessary cleanouts.

To start saving in your plant—soon—see your Nialk TRICHLOR distributor. He can show you why your best buy is the solvent that doesn't wear out prematurely. Call him today.

NEW 36-PAGE BULLETIN explains fully how you get more and better vapor degreasing for the money with Nialk TRICHLOR. Shows basic types of vapor degreasers. Discusses cycles, operating procedures, stabilizers, causes of solvent contamination, solvent recovery, trouble shooting. Ask your distributor for a copy or write us.

Nialk® Trichlor, a product of

HOOKER CHEMICAL CORPORATION

1203 Union Street, Niagara Falls, N. Y.

Sales Offices: Buffalo Chicago Detroit Los Angeles New York Niagara Falls Philadelphia Tacoma Worcester, Mass.
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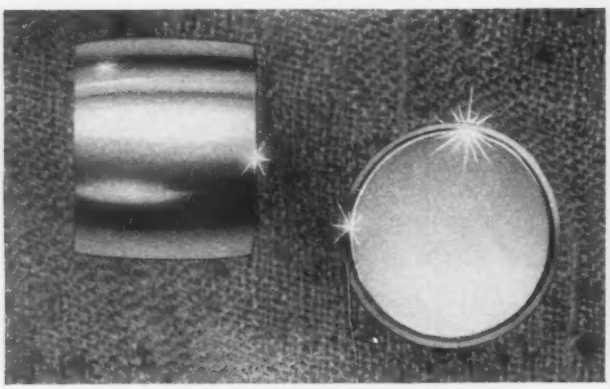
HOOKER CHEMICALS PLASTICS

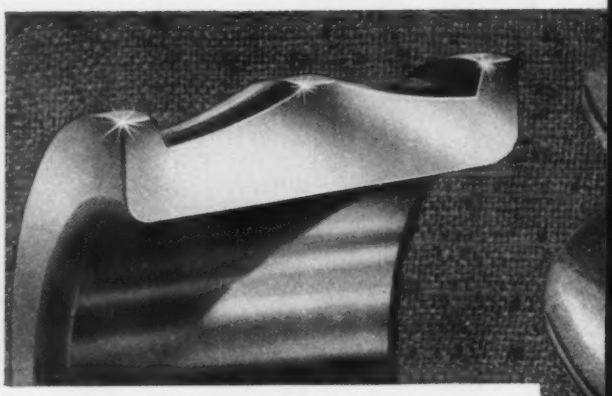
News! The best features of modern bearing design combined

Spherical

SELF-ALIGNING ROLLER BEARINGS BY LINK-BELT



BIG, HIGHEST-CAPACITY ROLLERS. Each bearing has a maximum number of rollers—as large as possible, yet all components are in optimum balance. Precision-ground to extreme accuracy, these convex rollers offer maximum economy for all applications.



HIGH, HEAVY INNER RACE FLANGES. Hefty inner race has sturdy shoulders which offer convenient hold for assembly and removal of bearing. They end problems of cutting away shaft or applying pressure at outer race . . . avoid any need to skimp on shaft shoulders.

BIG, mirror-smooth convex rollers *plus* heavy, broad-shouldered inner race *plus* centrifugally-cast bronze, precision-machined retainer! Only from Link-Belt do you get ALL that is best in bearing design.

Individually, these elements represent major improvements on accepted design concepts. Collectively, they constitute the most efficient spherical roller bearings available . . . promise unequalled economies, whatever the application. Men who know bearings will readily recognize new contributions to capacity, endurance and ease of maintenance.

For the good of your equipment, take time for a feature-by-feature comparison with any bearings you're now using. Your Link-Belt office or authorized stock-carrying distributor will gladly explain the many performance advantages evolved with this new design. And either can furnish full data on industry's most complete line of ball and roller bearings . . . pillow blocks and flanged, flanged cartridge, cartridge and take-up blocks.

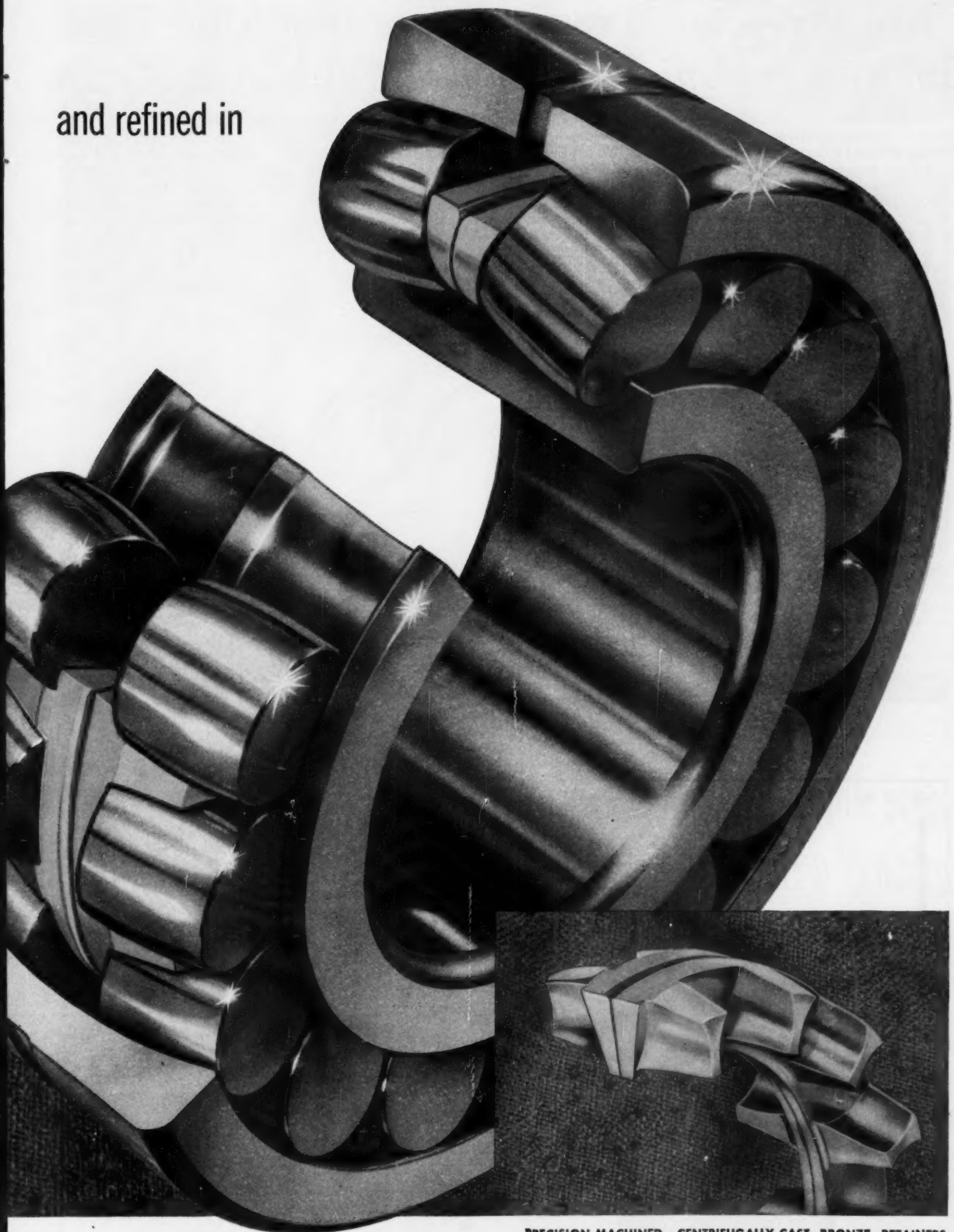
LINK BELT

THE SYMBOL OF QUALITY · LB · LINK-BELT

MANUFACTURER OF SELF-ALIGNING BALL AND ROLLER BEARINGS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

and refined in



PRECISION-MACHINED, CENTRIFUGALLY-CAST BRONZE RETAINERS offer many times more support and ability to withstand high stress. They are not stampings—they space rollers accurately under extreme speeds and loads. Independent cage action for each row of rollers assures maximum bearing efficiency.

Eye Protection Program Cuts Lost Time Eye Injuries *to Vanishing Point* at Fairbanks, Morse

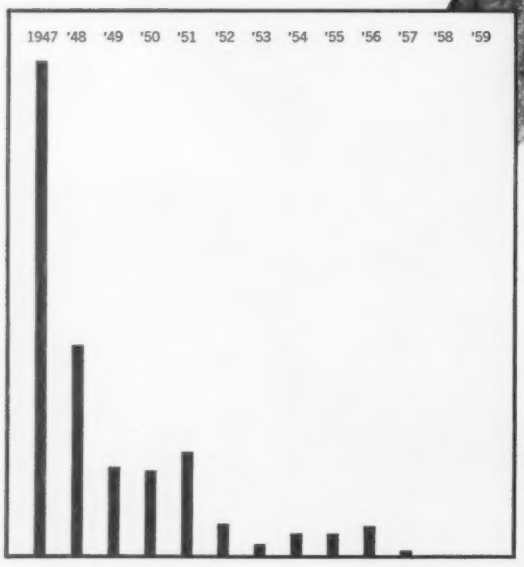
From 1947 thru 1957, lost time eye injuries at Fairbanks, Morse & Co., Beloit Works, dropped over 98%. In 1958 and 1959 there were no lost time eye injuries.

Mr. Jess Hogans, Safety Director, states: "Our management started in August 1947 to plan a compulsory eye protection program covering all employees and visitors at our Beloit Works. They were to wear approved eye protection at all times while in any shop or foundry. Involved were about 4,000 employees.

"We did not rush to put this program into effect. By the time we had all of the foremen convinced of the importance of eye protection (and because of the example they were setting), approximately 75% of the employees were also wearing eye protection. It was easy then to go all the way and the mandatory program went into operation June 1, 1948."

This is a remarkable story of suffering prevented, skills saved, eyes saved and dollars* saved. And remember, *quality* equipment such as that manufactured by American Optical featuring *safety standard frames and lenses* is a vital ingredient in achieving results like these. Write us at Southbridge, Mass., for brochure or call your nearest AO Safety Representative.

*Under Wisconsin Law minimum benefits paid to any employee for loss of vision in one eye is $9,250.

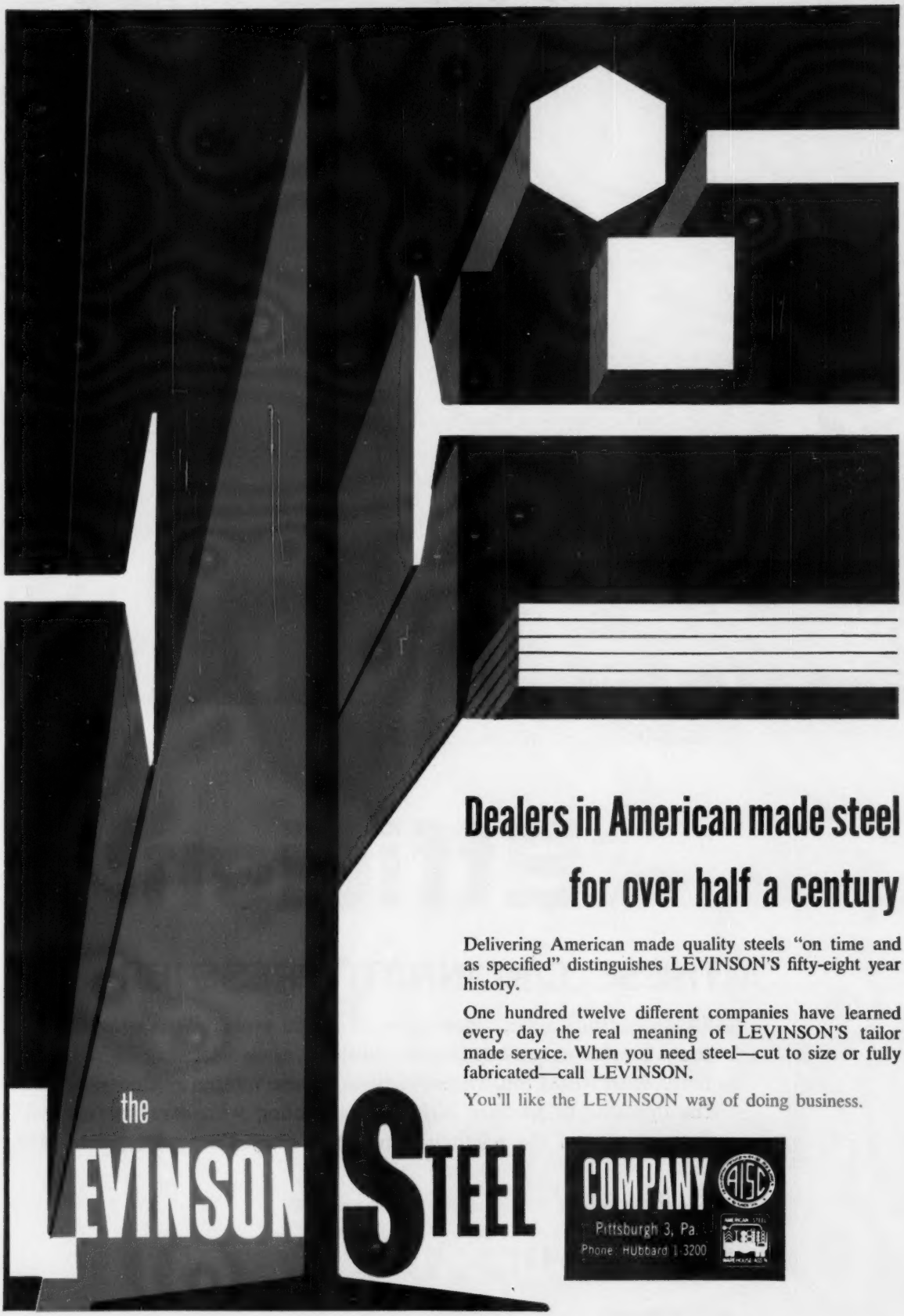


American Optical COMPANY
SAFETY PRODUCTS DIVISION

Safety Service Centers in Principal Cities

ALWAYS INSIST ON TRADEMARKED SAFETY PRODUCTS

Be Safe For Sure . . . With AO SURE-GUARD Glasses

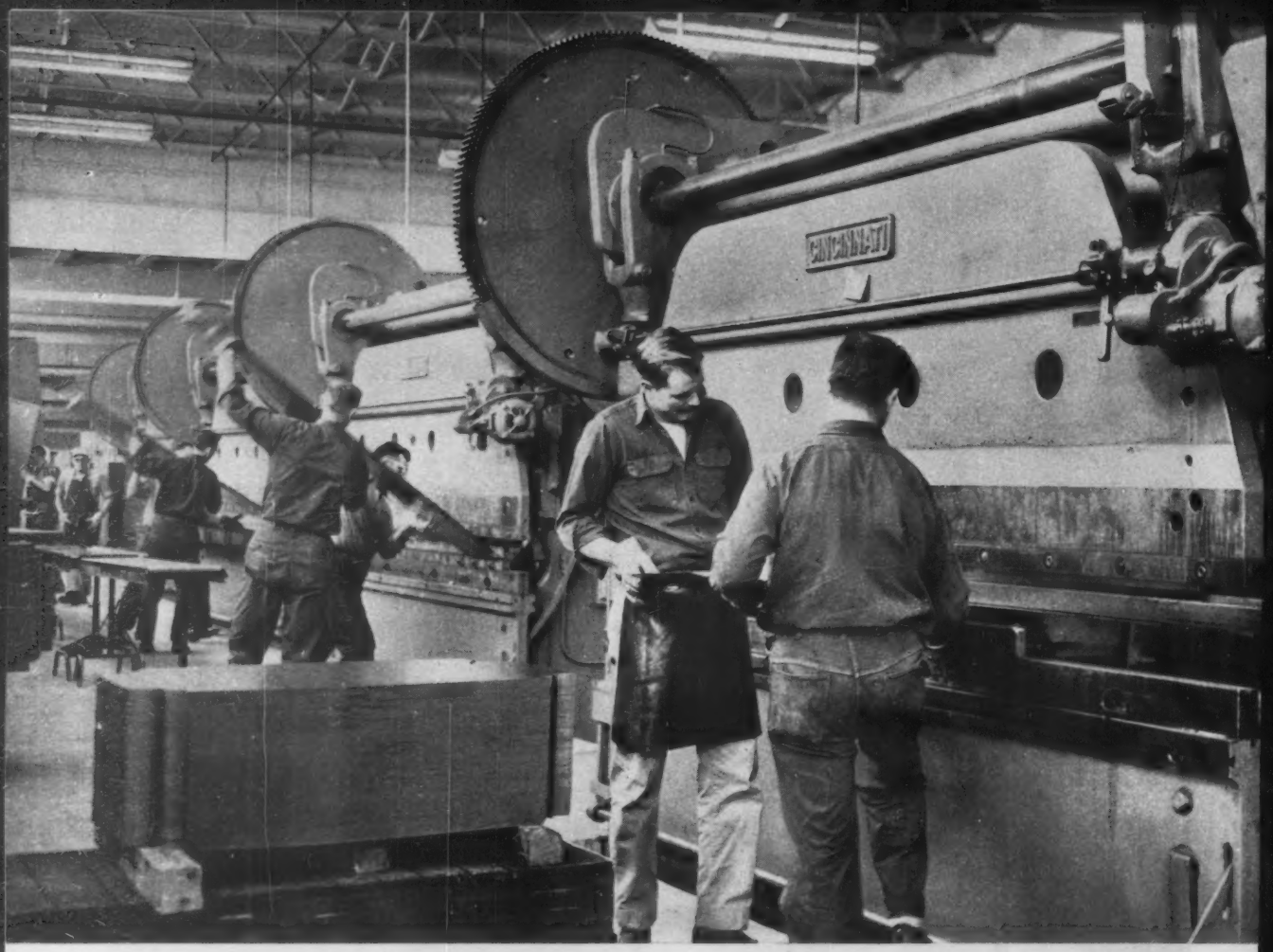


Dealers in American made steel for over half a century

Delivering American made quality steels "on time and as specified" distinguishes LEVINSON'S fifty-eight year history.

One hundred twelve different companies have learned every day the real meaning of LEVINSON'S tailor made service. When you need steel—cut to size or fully fabricated—call LEVINSON.

You'll like the LEVINSON way of doing business.

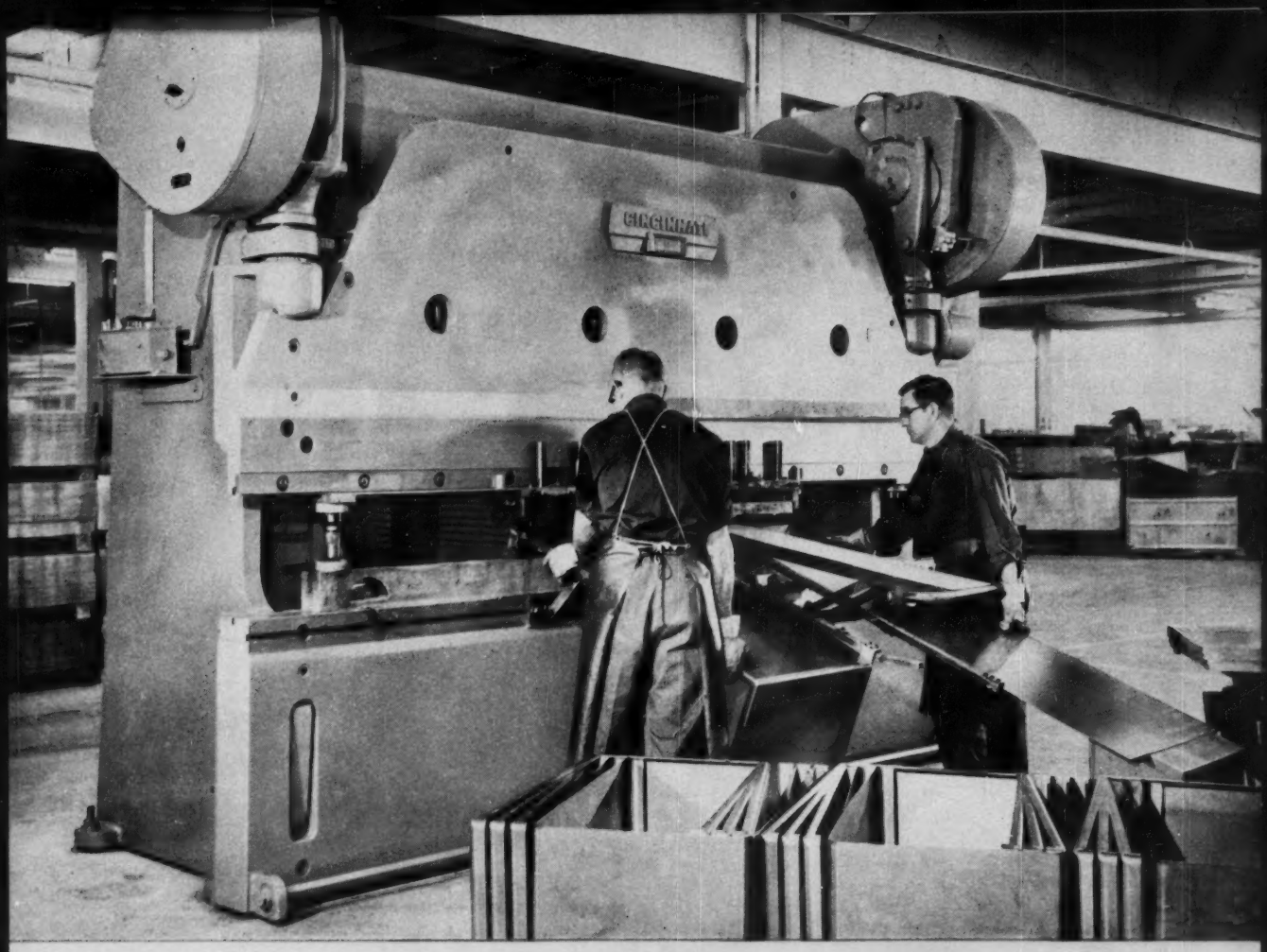


Courtesy Steelcase, Inc., Grand Rapids, Michigan

Efficiency

THESE CINCINNATI® PRESS BRAKES

"A million hits a year; downtime nil for 20 years." That's the story of these Cincinnati press brakes at Steelcase, shown forming 7/16" offset on four sides of a desk top. The ruggedness of these veteran machines "permits the operator to perform high speed pedaling with excellent control." Proof, again, of the reliability built into every Cincinnati press brake.



jumps 50%

FORM PROFITS FOR STEELCASE, INC.

50% more efficient than previous method, this 225-ton Cincinnati forms four radius corners on pedestal bodies. "High degree of accuracy and convenient operation," according to Steelcase, help operators produce 80 pieces per hour. The machine operates more quietly and takes less floor space than their previous equipment.

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.

For a money-saving balance

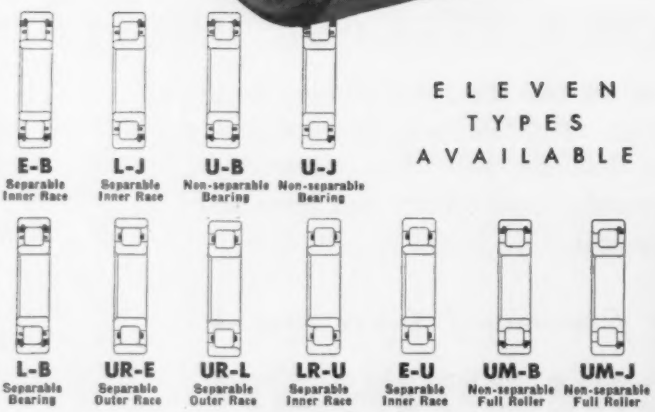
between maximum performance and moderate cost . . .

ROLLWAY Tru-Rol® BEARINGS

Give you more for your bearing dollar

For those hundreds of in-between applications where performance requirements are more exacting than those provided by the ordinary commercial bearing, but where maximum precision would be unneeded precision — specify Tru-Rol for the job.

Tru-Rol Bearings provide above-commercial-grade efficiency . . . at worthwhile savings in cost. Internal clearances are closely controlled. Rollers are equally spaced to eliminate out-of-balance vibration. Each roller is crowned to distribute the load evenly along the full length of the roller. Eleven types available in single and double width bearings, in stamped steel retainer, segmented retainer or full roller construction.



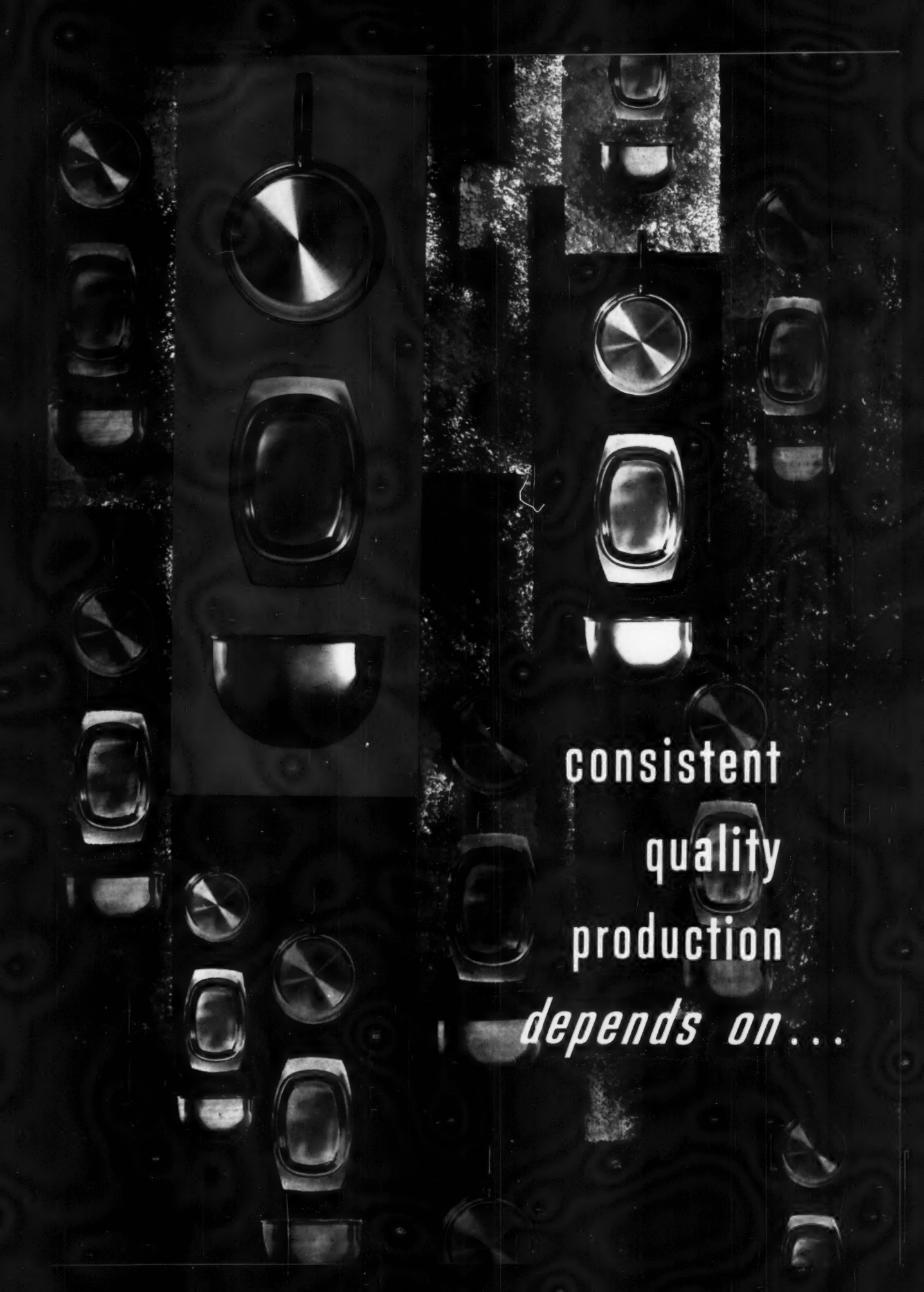
ELEVEN TYPES AVAILABLE

Ask your nearby Rollway Service Engineer to detail the quality you *should be getting* in your "commercial grade" bearings. Or write for the Rollway Tru-Rol catalog showing the full line, and capacity and size ranges. ROLLWAY BEARING COMPANY, INC., Syracuse, N. Y.

ROLLWAY® BEARINGS

COMPLETE LINE OF RADIAL AND THRUST CYLINDRICAL ROLLER BEARINGS

ENGINEERING OFFICES: Syracuse • Chicago • Toronto • Cleveland • Seattle • San Francisco • Boston • Detroit • Pittsburgh • Houston • Philadelphia • Los Angeles


consistent
quality
production
depends on...

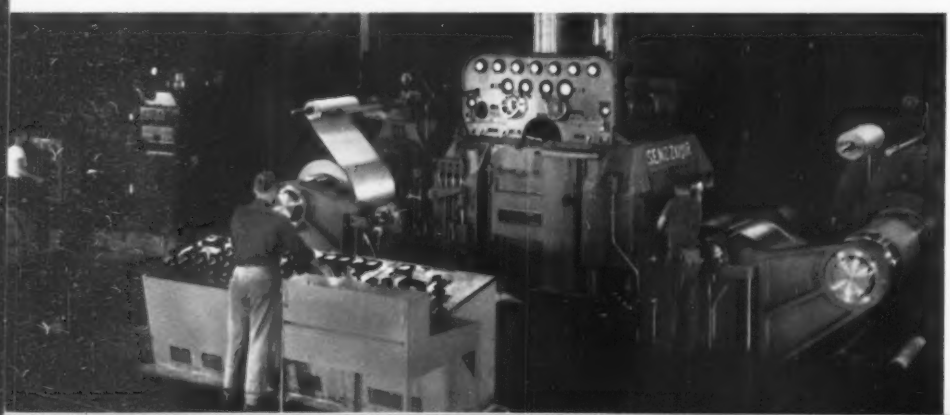
consistent quality

J&L STAINLESS

You can do more with Consistent Quality stainless steel because it increases yields by reducing rejects due to metal variations, eliminates production delays, and lowers tooling costs. In effect it insures your profit.

J&L Consistent Quality is the result of unique melting practices combined with the industry's most advanced facilities for producing stainless sheet, strip, bar and wire. J&L actually leads the industry in melt shop standards, the point where quality starts; and maintains that quality through every production operation.

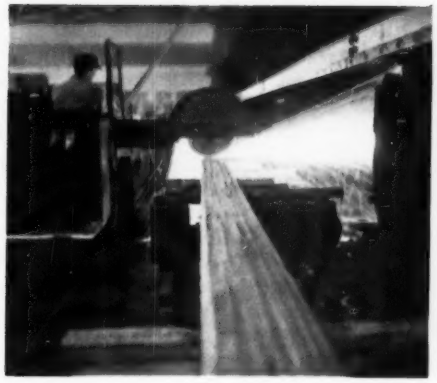
To solve your production problems caused by quality variations in materials, contact your J&L distributor today.



Sendzimir mill rolling assures precise gauge accuracy coil after coil.

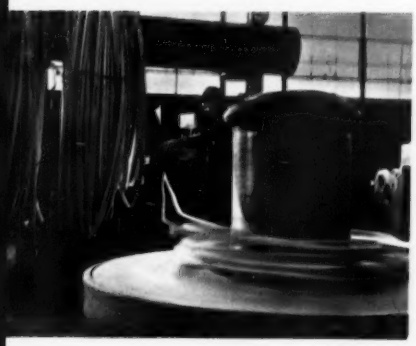
Every phase of melting from the selection of scrap to the pouring of ingots is carefully controlled with laboratory precision by constant testing.

The quality of billets and slabs governs the quality of finished products.



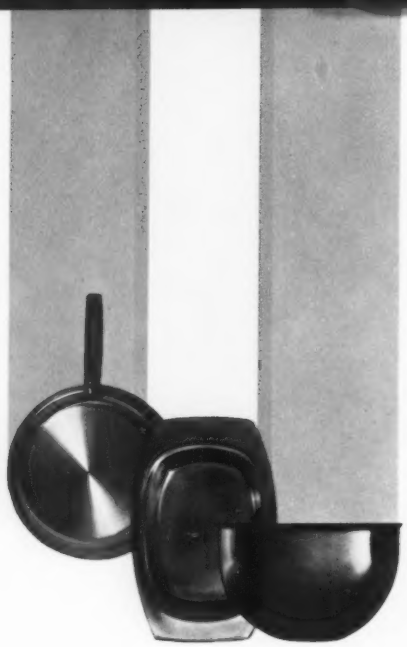
Conditioning of slabs and billets to exacting standards assures flawless surface finishes.

stainless steel



Typical of all J&L equipment is the industry's most modern 4-block wire drawing unit.

The industry's largest bar inventories guarantee fast service. Comparable inventories of sheet and strip will assure speedy service for flat rolled products.



consistent quality stainless steel

is as near as your telephone

WESTERN UNION call operator 25

(EFFECTIVE APRIL 1960)

Your J&L stainless steel distributor can serve you better *because J&L serves him better,* backing him with the full facilities of J&L's Stainless and Strip Division.

Your J&L distributor can reduce your costs by providing a complete range of pre-production services, and doing it economically! He can save you the capital investment required to maintain long term inventories; and can help you eliminate the costs of overhead connected with stocking, accounting, and the inevitable losses incurred through waste and obsolescence due to specification changes.

Technical assistance in solving production problems is also available from your J&L distributor. And when those problems are connected with an application using stainless steel, J&L's own staff of technical specialists will promptly answer your distributor's call for additional help.

Even when advanced research is required you can call on your J&L distributor in confidence. He will be happy to discuss your problems because he knows he is backed by one of the world's most respected teams of metallurgists—J&L's own staff in laboratories at Detroit and the famous Graham Research Laboratories at Pittsburgh.

Your J&L distributor is as near as your telephone. Call Western Union Operator 25 for the name of your J&L distributor of Consistent Quality stainless steel.

This manual is your guide to the selection of stainless steel sheet and strip. Write for your free copy.

Plants and Service Centers.
Los Angeles • Kenilworth (N. J.) • Youngstown • Louisville (Ohio) • Indianapolis • Detroit

STAINLESS
SHEET • STRIP • BAR • WIRE

Jones & Laughlin Steel Corporation • STAINLESS and STRIP DIVISION • DETROIT 34

Four giant double-width Buffalo Fans cooling mill motors of a well-known West Virginia steel plant.

Mill motor cooling requires a high-capacity installation that will keep delivering continuously — (sometimes millions of cfm) like the above battery of Buffalo Type "BLD" Fans. In jobs of this size and importance, fan strength and stamina are of the essence. Fan failure could shut down a mill. And handling such large volumes of air makes fan efficiency a major consideration.

On all counts, Buffalo Fans measure up. ***Buffalo*** heavy steel plate housings; strong steel plate wheels with massive hubs, heavy back plates, wheel flanges and die-formed blades provide the rigid strength required. ***Buffalo*** directional inlet vanes, bell inlet with matching dished wheel flange and backward curved blades provide the smoothest possible air passage through the streamlined housing — for highly stable performance and efficiency that conserves driving power.

Whether you need dependable mill motor cooling, sintering, draft or mill ventilation, investigate the "Q" Factor* of superior design and construction that makes ***Buffalo*** your best fan buy. Write us concerning your air job, or contact your nearby Buffalo Engineering Representative.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, NEW YORK

Buffalo air handling equipment to move, heat, cool, dehumidify and clean air and other gases.

Buffalo Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

Buffalo Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

You Can Afford Borg-Warner Quality

FULL 360° ROTATION

Jib Master

Borg-Warner QUALITY-RATED Jib Crane

MAXIMUM COVERAGE

The Jib-Master is also available with Pillar Foundation mounting. Either model can be used with chain block or electric hoist.

QUALITY-RATED CHECK LIST

- Head assembly pivots on heavy-duty tapered roller bearings.
- Head assembly accurately positioned and welded for perfect alignment of jib. Heavy side plates.
- Two large-diameter, carefully machined side rollers, each with two precision ball bearings for smooth jib rotation.
- Heavy-wall seamless steel pillar.
- Heavy circular base plate, 6 large gussets and pillar welded together to form a rigid frame.

Mass-production economies put Jib Master way out front in performance and value . . . and at a price you can afford.

Entirely self-supported, the Jib Master swings freely through a full 360° for efficient hook coverage over the maximum work area. Two bottom load carrying rollers, each have two heavy-duty precision ball bearings. The top pivot is a heavy duty tapered roller bearing. Six large gussets, together with pillar and heavy steel base, form a rigid, all-welded unit. Whatever your overhead materials handling requirements, it will pay you to obtain full details and prices today.

Find Your Nearest Distributor Under CRANES in The Yellow Pages

Distributors in all principal industrial cities

Industrial CRANES I B-W INGERSOLL PRODUCTS BORG-WARNER

Design it better . . . Make it better.

Borg-Warner® INDUSTRIAL CRANES

1550 S. PAULINA STREET, CHICAGO 8, ILLINOIS

Export Sales: Borg-Warner International, 36 South Wabash St., Chicago 3, Illinois

Another example of National Roll quality control

Elmer Grinder, left, of National's steel foundry discusses chill location with Bill Williamson of the Sales Department.

Roll molds determine life, not just dimensions

Molding techniques for steel rolls are, of course, directed at obtaining a casting with accurate dimensions for economical machining into precise shaped or plain rolls.

But just as important as dimensions —determined by the "sweep" pattern shown above—is the metallurgical function built into every roll mold. Metal "chills" are carefully located to control cooling of the steel in a manner that will produce a roll both metallurgically and physically sound.

Started on paper, the chill layout is translated into a mold of metal and sand under the watchful attention of National's experienced steel foundry personnel. These men know foundry practice. But perhaps more importantly, they know the demands that are made on roll soundness in the customer's mill.

This is a part of National's service which means better rolls for you. It's one of the many reasons why . . .

National's the growing name in rolls

NATIONAL ROLL & FOUNDRY DIVISION

GENERAL STEEL CASTINGS CORPORATION, Avonmore (Westmoreland County), Pa.

General Steel Castings Corporation, General Offices: Granite City, Illinois • Plants: Granite City, Ill., Eddystone, Pa., Avonmore, Pa.

CF&I Heavyweight Shaped Coils

PACKAGED for YOUR PRODUCTION

Mr. Marwil points out in-plant handling and unloading is more efficient and economical with CF&I Shaped Coils than with mill coils. Shaped coils can also be stored more compactly.

give long production runs at Marwil Products Co.

With a 12 million unit annual capacity, Marwil Products Co., Fort Loramie, Ohio, is rated as the largest U. S. manufacturer of muffler clamps and U-bolts. Nine months ago the company switched to CF&I Wire. Mr. William Marwil, Vice President tells why:

"We find CF&I's 2000 lb. shaped coils of clean, bright basic wire are very uniform, with no 'thin' areas or rough finish. These large coils give us longer runs without the necessity for frequent set-ups on our Lewis Cut Off machines."

In addition to the high quality of CF&I Wire, new packaging methods have increased the preference for CF&I Wire.

Replacing small, light-weight coils are CF&I Shaped Coils and spiders. The spider, leased from CF&I, acts like a spool, and pays off the wire evenly and smoothly. Now, instead of losing hours of production time every day in changing small coils or unravelling tangled wire, *one* CF&I Shaped Coil can usually last many hours. The shaped coils and spiders make for easier handling and storage, too.

One of our salesmen will be glad to recommend the right "package" to increase your production and cut manufacturing costs. You can call your nearest CF&I sales office today and arrange a "no obligation" visit.

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

CF&I STEEL

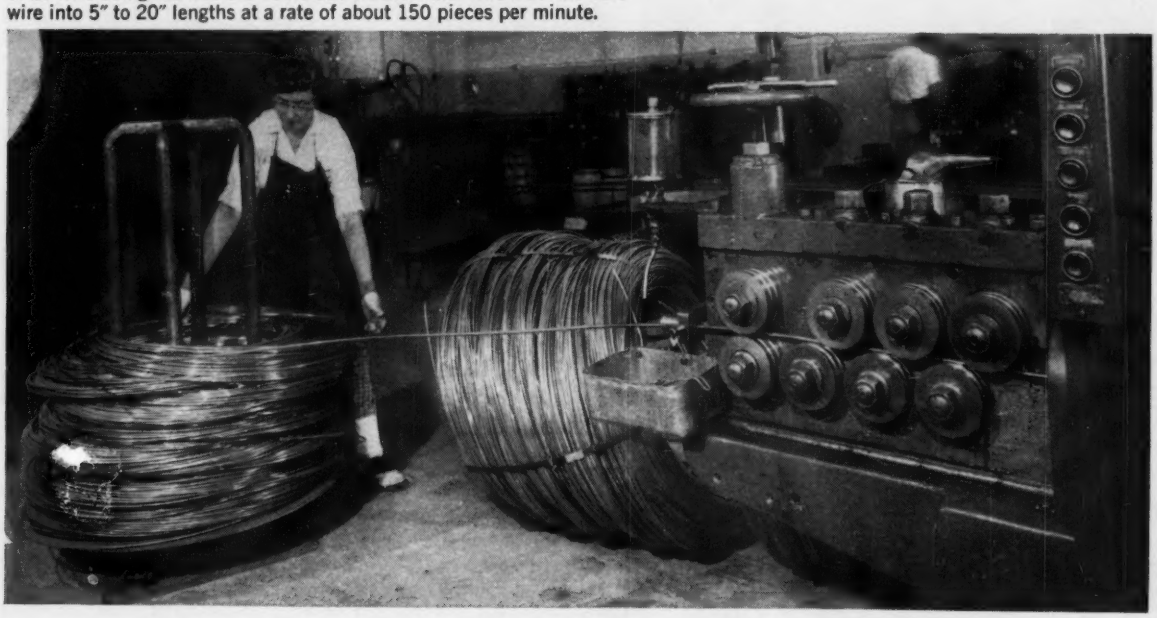
7346

In the West: THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Farmington (N. M.) Ft. Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco San Leandro • Seattle • Spokane • Wichita

In the East: WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

CF&I OFFICE IN CANADA: Montreal • CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

CF&I Wire being fed into the Lewis Cut Off machine. This machine cuts wire into 5" to 20" lengths at a rate of about 150 pieces per minute.



• This Merchant Bar Mill, recently delivered to Ceco Steel Products Corporation at Lemont, Illinois, has many automatic features including escapement repeaters and mechanical turning devices enabling it to handle all bars mechanically.

The *14*-stand mill, designed to roll mild steel, includes a 4-stand in line roughing mill, a 4-stand intermediate continuous mill, a cross country mill and a continuous finishing mill. It rolls rounds, squares, deformed reinforcing bars, flats, angles and architectural window sash sections.

Designed by Birdsboro, in cooperation with Ceco Engineers, this mill is another example of our ability to give customized mill equipment assistance to steel producers. Your Birdsboro representative can tell you about other cases which may closely parallel your own. Call him in soon. *Sales Department, Engineering Department and Mfg. Plant:* Birdsboro, Pa.; *District Office:* Pittsburgh, Pa.

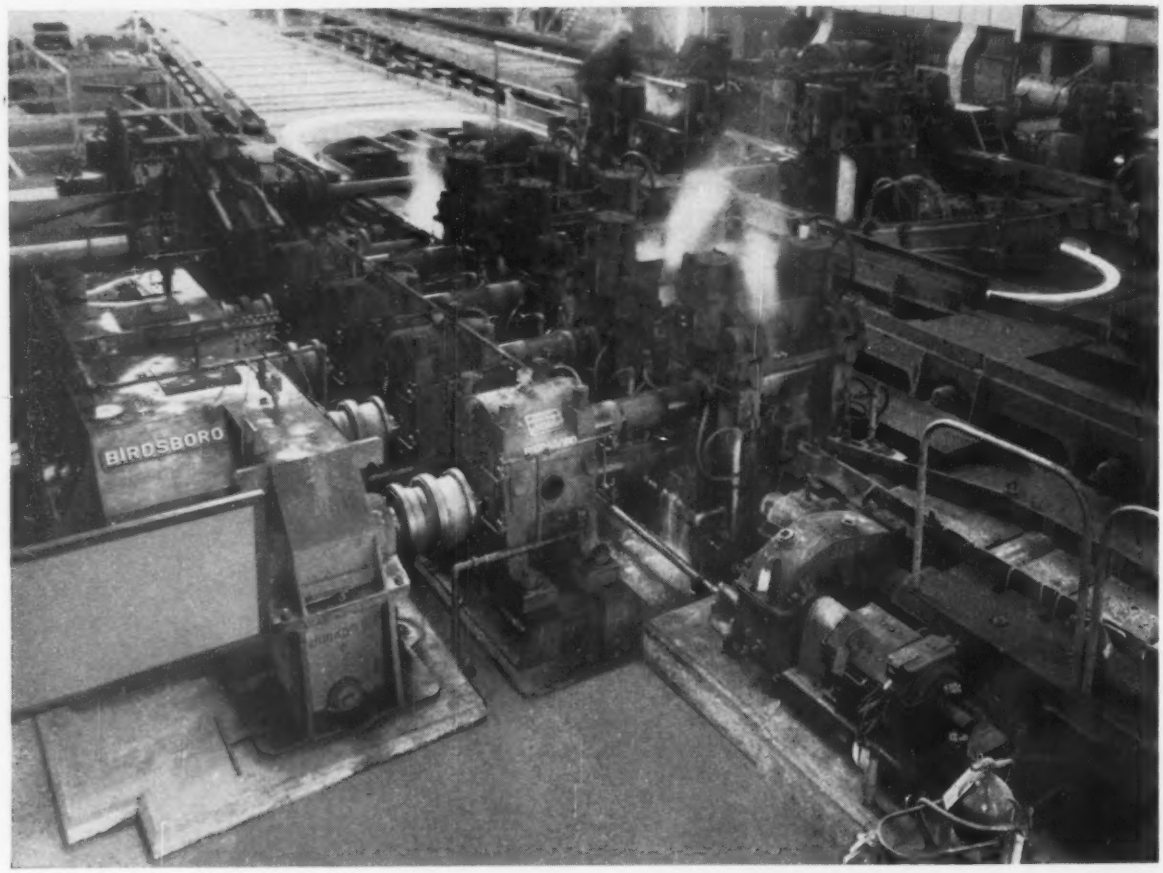
First mill designed exclusively

to direct roll electric steel

ingots of up to 1000#

into finished bars...

another **BIRDSBORO** *"first"*



MM84-60

BIRDSBORO
CORPORATION

STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • STEEL CASTINGS • Weldments "CAST-WELD" Design • ROLLS: Steel, Alloy Iron, Alloy Steel.

Revere helps "fit the metal to the job"

AND A MAKER OF MEDICINE CABINET MIRROR FRAMES SAVES $10,000 A YEAR

As a result of a suggestion made by one of Revere's Technical Advisors, a maker of mirror frames for medicine cabinets has saved $10,000 a year on polishing costs alone. The suggestion was that, by changing to a brass of different grain size, the manufacturer might be able to save money on polishing costs and at the same time improve the quality of his product. (The 90° bend to which the mirror frames are subjected also had to be taken into consideration.)

Samples were made using a Revere Brass Strip with a smaller grain size as recommended by the Technical Advisor. Tests showed that, as a result of the change the manufacturer was able to realize a saving of 17¢ per mirror frame on polishing costs alone, with no increased costs in other operations, including the 90° bend. Based on the saving per frame this manufacturer has saved $10,000 per year for the past 4 years!

Here is still another example of how Revere's Technical Advisory Service working with the customer and the mill helped "fit the metal to the job," thus saving the customer money as well as improving product quality.

Why don't you take advantage of the extensive knowledge of Revere's Technical Advisory Service in "fitting the metal to the job?" It's entirely possible this service can save you money . . . help improve the quality of *your* product.

REVERE COPPER AND BRASS INCORPORATED

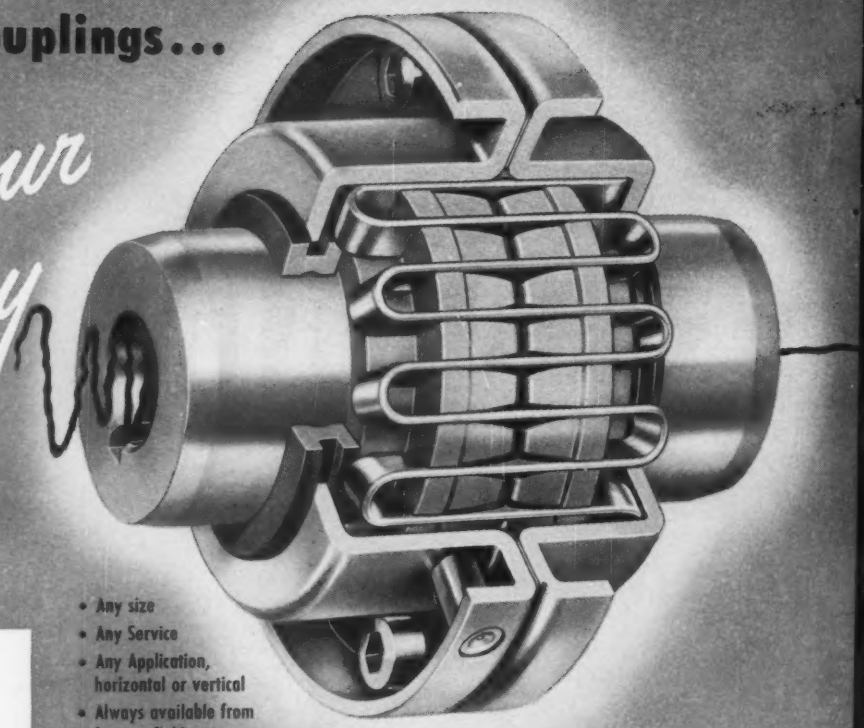
Founded by Paul Revere in 1801

Executive Offices: 230 Park Avenue, New York 17, N. Y.

Mills: Rome, N. Y.; Baltimore, Md.; Chicago, Clinton, Ill.; Detroit, Mich.; Los Angeles, Riverside and Santa Ana, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Newport, Ark.; Fort Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.

Falk Steelflex Couplings...

Protect your machinery in 2 ways



- Any size
- Any Service
- Any Application, horizontal or vertical
- Always available from factory, field or distributor stocks

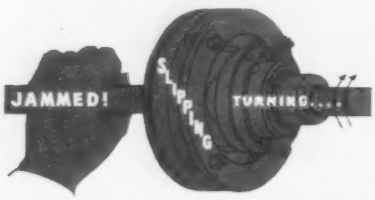
FALK and STEELFLEX are registered trademarks

Falk Controlled Torque Couplings prevent damage from overloads

In applications where danger from overloads exists, use the FALK Type FT Controlled Torque Coupling. The Type FT has all the features and advantages of standard FALK Steelflex couplings—and, in addition, has an adjustable friction slip clutch, enabling the operator to set the coupling to slip at any predetermined overload.

This controlled-torque principle not only prevents transmission of dangerous shocks and limits overloads; it eliminates the breaking of shafts caused by jamming of driven equipment.

An outstanding advantage of the Type FT Coupling is that, as soon as the cause of the overload is removed, the entire coupling will rotate and transmit power without replacing parts or repairing coupling.



There's real economy in using Type FT Controlled Torque Couplings. Many users have reported that these couplings paid for themselves the very first time they slipped (under overload) because of the protection against damaged driving or driven machinery!

...cost less per year of service!

You get *double protection* when you connect your driving and driven machinery with a Falk Steelflex Coupling—the all-steel coupling with the exclusive grid-groove design! First, its *torsional resilience* smothers shock and vibration; and second, the Steelflex design prevents damage and lowered efficiency by accommodating shaft misalignment.

Why have increasing numbers of key men in industry standardized on Falk Steelflex Couplings? Their experience has proved that Falk Steelflex Couplings prolong the service life of their machinery... are trouble-free and need minimum maintenance . . . are easy to install, lubricate and disconnect . . . and *cost less per year of service* than ordinary couplings.

One basic Steelflex design—the type F, in its many sizes—is adaptable to more than 90% of all industrial applications. For applications involving danger from overloads, Modified Type FT Controlled Torque couplings (see column at left) are ideally suited. There are numerous other special or dual purpose Steelflex couplings for unusual applications. **Write to Department 247** for engineering bulletin, including selection and dimension tables.

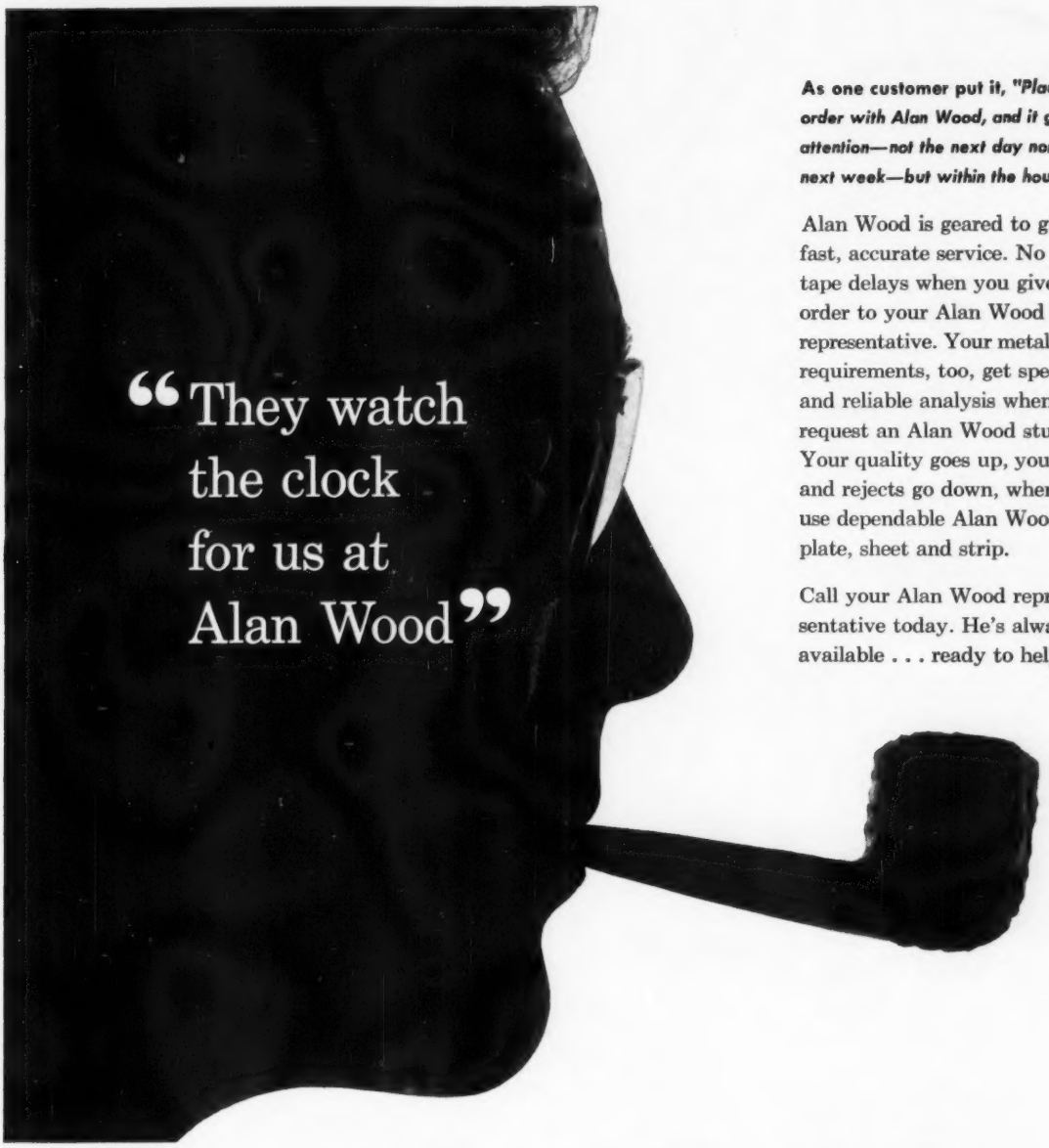
THE FALK CORPORATION, MILWAUKEE, WISCONSIN

FALK

...a good name in industry

MANUFACTURERS OF:

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining



As one customer put it, *"Place an order with Alan Wood, and it gets attention—not the next day nor the next week—but within the hour!"*

Alan Wood is geared to give you fast, accurate service. No red tape delays when you give an order to your Alan Wood representative. Your metallurgical requirements, too, get speedy and reliable analysis when you request an Alan Wood study. Your quality goes up, your costs and rejects go down, when you use dependable Alan Wood plate, sheet and strip.

Call your Alan Wood representative today. He's always available . . . ready to help.

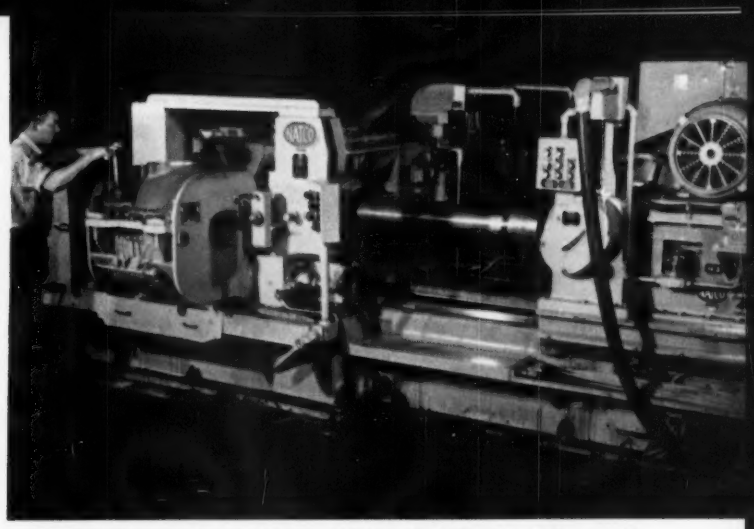
ALAN WOOD STEEL COMPANY

Conshohocken, Pa. • **STEEL PRODUCERS WITH THE CUSTOMER IN MIND**

DISTRICT OFFICES AND REPRESENTATIVES: Philadelphia • New York • Los Angeles • Boston • Atlanta Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver, Canada: A. C. Leslie & Co., Limited

NATCO

Flopover cradle makes for unobstructed top loading. Holes are bored in two directions without change of setup in this off-highway truck differential carrier assembly.



L-shaped Natco special for boring right-angle holes has both rough and finish cycles. It handles two sizes of parts.

Handling Ease Alone Justifies This Natco Special

This husky Natco does one job well—It bores big holes in hard-to-handle, heavy cast steel parts.

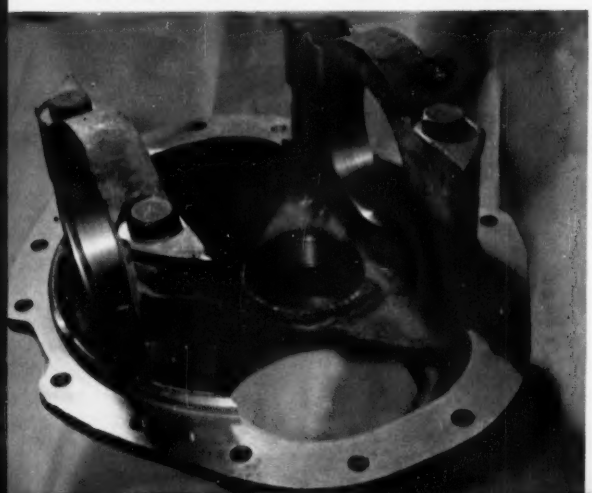
International Harvester Co., Melrose Park, Ill., cuts handling time in half with this Natco special, and look what else it gets: better finish on the bores, longer tool life, improved alignment, tighter tolerances, and more parts per hour. In short, higher quality and greater productivity. And a standard boring mill is released for general purpose chores.

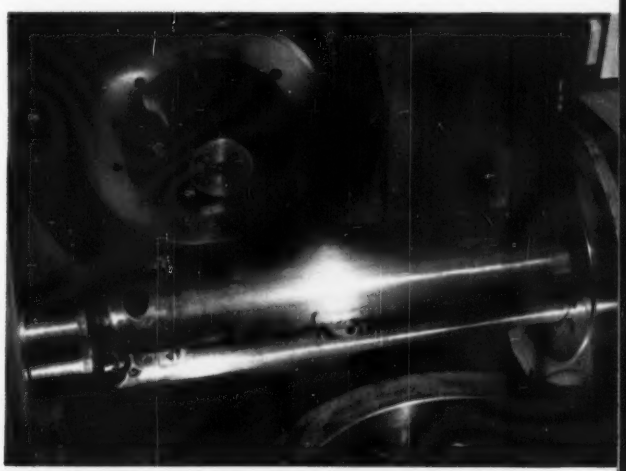
For such extra benefits from specials, call your Natco representative today.

NATCO

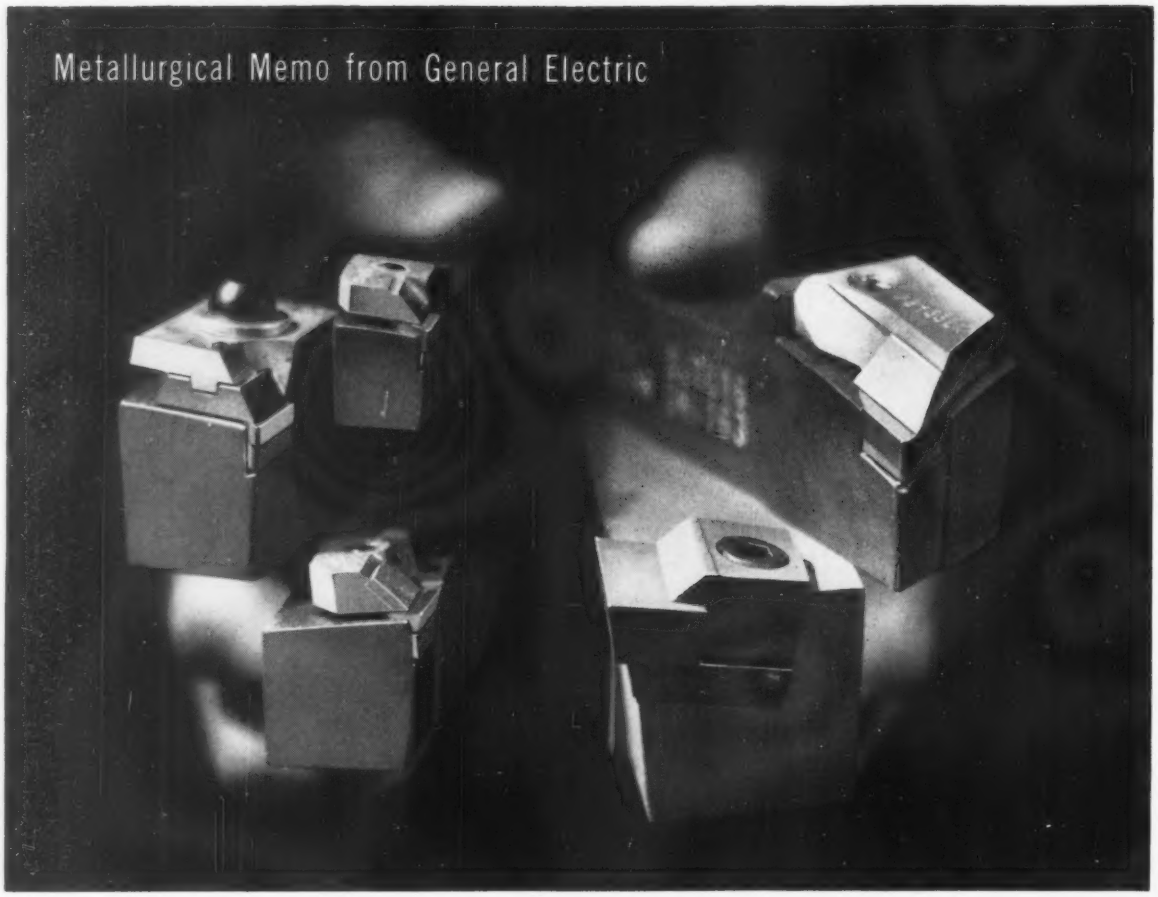
The National Automatic Tool Company, Inc., Richmond, Indiana

Only two boring bars with expanding bit heads are needed to bore these several different diameters and faces.





Bits expand from boring heads. Head entering at top bores 4.725″ and 10.250″ holes at the same time.



Pick the one you need . . . there's a G-E Carboloy® toolholder for every metalcutting purpose

Designed to do a better job more efficiently, Carboloy toolholders help you get BETTER PROFITS THROUGH BETTER TOOLING

Even the very finest cemented carbide inserts (Carboloy carbides) can't do a decent machining job if the toolholder is inferior.

That's why the Metallurgical Products Department of General Electric has evolved a line of toolholders to do a superior job in every metalcutting operation. Carboloy toolholders get the mileage out of inserts . . . take the headaches out of machining.

Choose from: Lift-O-Matics, with self-raising chip-breaker clamp (positive rake, negative rake – 20 styles, 186 sizes total); Adjust-O-Breakers, with the chip-breaker versatility of *many* toolholders (negative rake – 10 styles, 30 sizes); Tracers (positive rake, negative rake – 8 styles, 19 sizes total); Heavy-duty (8 styles – 10 sizes).*

These, along with the complete line of Carboloy inserts, insert seats, convertible seats, and brazed tooling, are all designed to help you attain "BETTER PROFITS THROUGH BETTER TOOLING." Check with your Authorized Carboloy Distributor today. Or write: *Metallurgical Products Department of General Electric Company, 11141 E. 8 Mile Road, Detroit 32, Michigan.*

**Available through Canadian General Electric Company, Limited, Toronto, Ont., and through International General Electric Company Division, General Electric, International, New York, N.Y.*

CARBOLOY®
CEMENTED CARBIDES

METALLURGICAL PRODUCTS DEPARTMENT

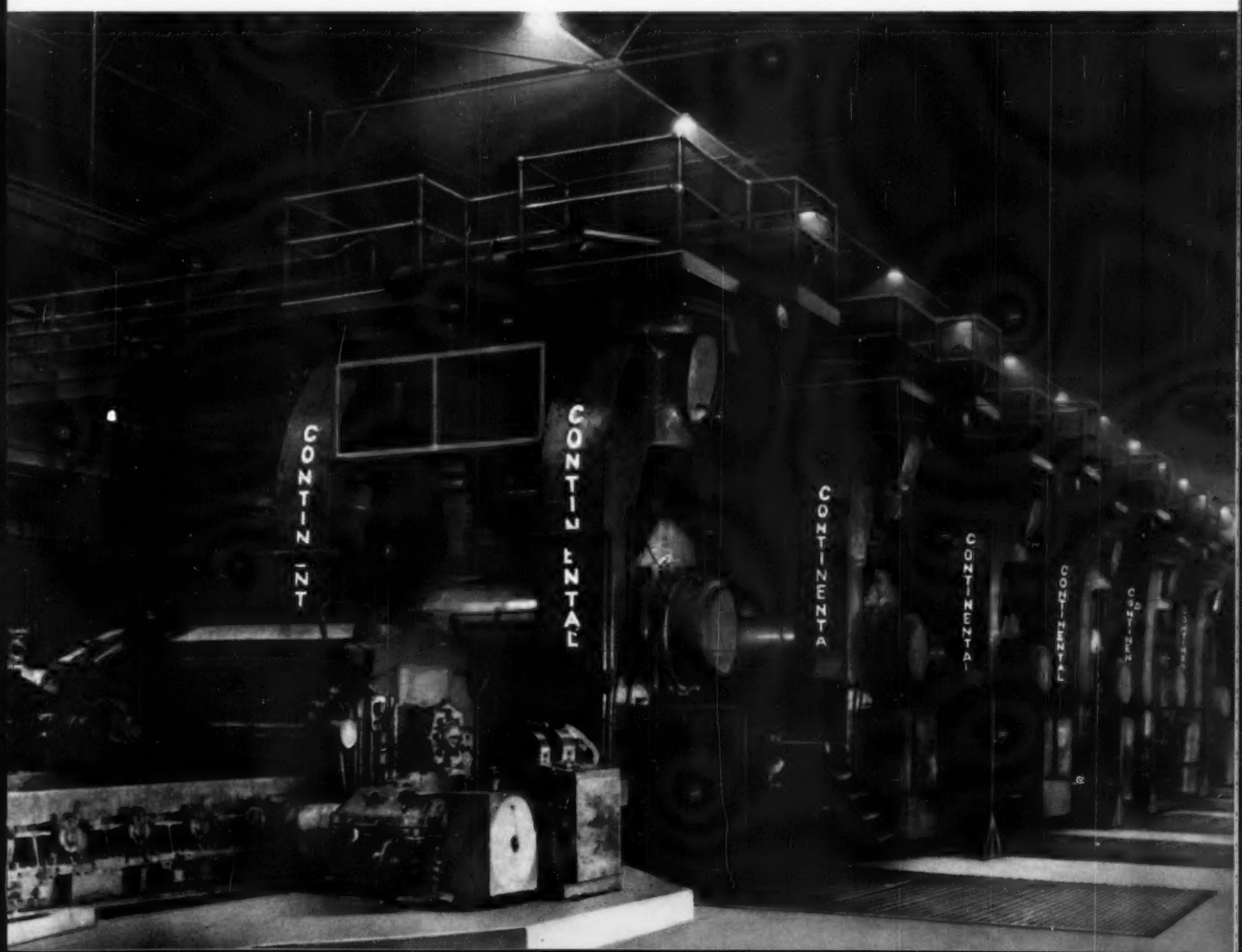
GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS • MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

BLAW-KNOX

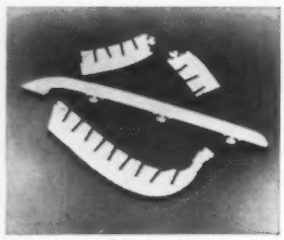
Blaw-Knox designs and builds a full range of continuous, semicontinuous, and single stand reversing hot strip mills. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals, sheet and strip processing equipment, electrolytic tinning, annealing, and galvanizing lines, seamless pipe and tube mills, draw benches, and cold draw equipment, Blaw-Knox Medart cold finishing equipment, iron, alloy iron and steel rolls, carbon and alloy steel castings, fabricated steel plate or cast-weld design weldments, steel plant equipment, and heat and corrosion resisting alloy castings. Blaw-Knox Company. Foundry and Mill Machinery Division. Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

80-inch continuous hot strip mill



PRECISION Quarterly NUMBER 4

PRECISION WELDER AND FLEXOPRESS CORPORATION, 3520 Ibsen, Cincinnati 9, Ohio



For this magnificent automobile, these aluminum stampings mean . . .

Grille Parts TEN TIMES FASTER

DETROIT – How much would you pay for a 900 per cent boost in production efficiency? The builder of one of America's most fashionable automobiles decided it was well worth the price of a new Precision Flexopress.

The automaker had been punching out grille parts on standard sheet-fed presses. The fins are made of .120" aluminum. They have to interlock, egg-crate fashion, and look flawless in the finished product. But even for flawless decoration, the production rate of only 1000 fins an hour was exasperatingly slow.

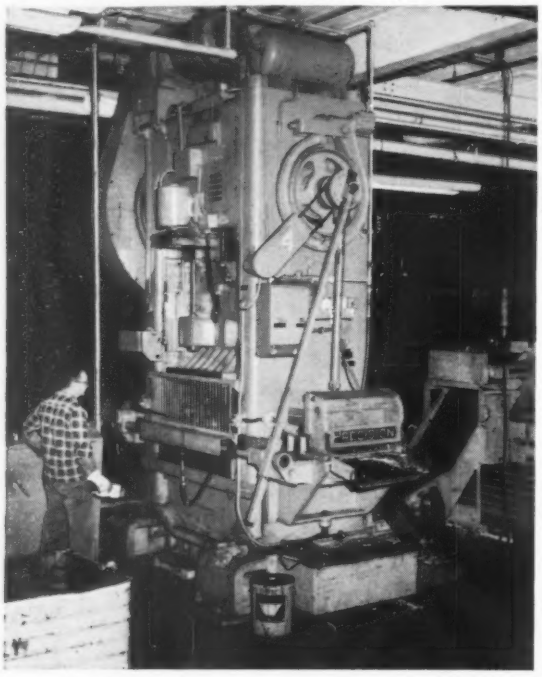
That was before the new Flexopress was installed. Now this same automaker turns out 1000 fins in seven minutes, which is a very fortunate situation because his cars are selling fast.

The Flexopress came equipped with unreeling and flattening equipment for handling up to 22" wide coils. Otherwise, it is a standard, heavy-pattern, 200-ton Flexopress with 6" stroke, complete with built-in coil feed, and designed for general purpose blanking, forming, and light drawing.

It got so far ahead on grille fin production that Planning started pulling jobs off slower presses and putting them on the Flexopress. One was an 11½" long hood retainer spring which the Flexopress proceeded to blank and punch from wide steel strip at a rate of 120 per minute, and with the die off center, too.

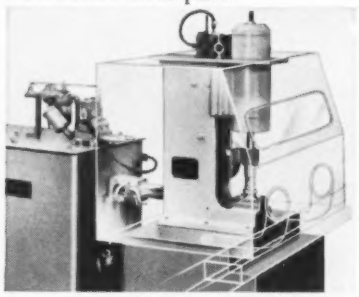
People who know presses know the reasons: The Flexopress is the only press constructed with pre-loaded, ball bearing slides. With no sliding ways to heat up, there's no thermal misalignment and no lubrication problem. The ram can't oscillate – it moves in one plane only and holds its alignment. That means longer die life and accuracy that doesn't depend on leader pins and bushings. So it's no idle boast that at 150 strokes a minute, this 200-ton press with 6" stroke can really hold its bottom-of-ram-to-bed accuracy of .0005" or less per foot of bed length.

The reputation of a press is based on the job it does – and Flexopress is winning bouquets for its work at this automotive sheet metal plant.



PRECISION Flexopress made a 900 per cent boost in grille production possible.

NO WELD TOO CRITICAL



WELDED TRANSISTORS? OF COURSE!

Here's a new line of Precision Magnetic Force Welding Gun machines developed for making ring welds to seal transistor "cans." Clean-cut design makes it easy to enclose these guns in dry boxes for controlled atmosphere welding. Magnetic force, which applies pressure at the critical moment of maximum heat, assures a 98 per cent or better yield of gas tight welds on transistors big as a walnut or small as a grain of rice.

Remember, when you want to make critical welds, Precision has the experience to help you do the job right.

Lowest price

doesn't always mean best buy. When you buy chromium alloys "cheap," it may be the most expensive alloy purchase you've ever made.

Fact is, there's only one way to save money when you buy ferroalloys. And that's by choosing the *right* one for the *right* job. But how to do this, when there are hundreds of different applications and dozens of different chromium products? Simple solution. Call your VCA representative.

VCA has a really complete line of quality chromium products, including briquettes. That's why your VCA man can give you an impartial recommendation. No axe to grind, because your satisfaction is his satisfaction. For the alloy that will give you the best possible results at the lowest possible final cost, call your VCA District Office soon! Vanadium Corporation of America, 420 Lexington Avenue, New York 17, New York • Chicago • Cleveland • Detroit • Pittsburgh

Be sure to see us at the AIME Open Hearth Meeting, Palmer House, Chicago, April 4—6.

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Producers of alloys, metals and chemicals

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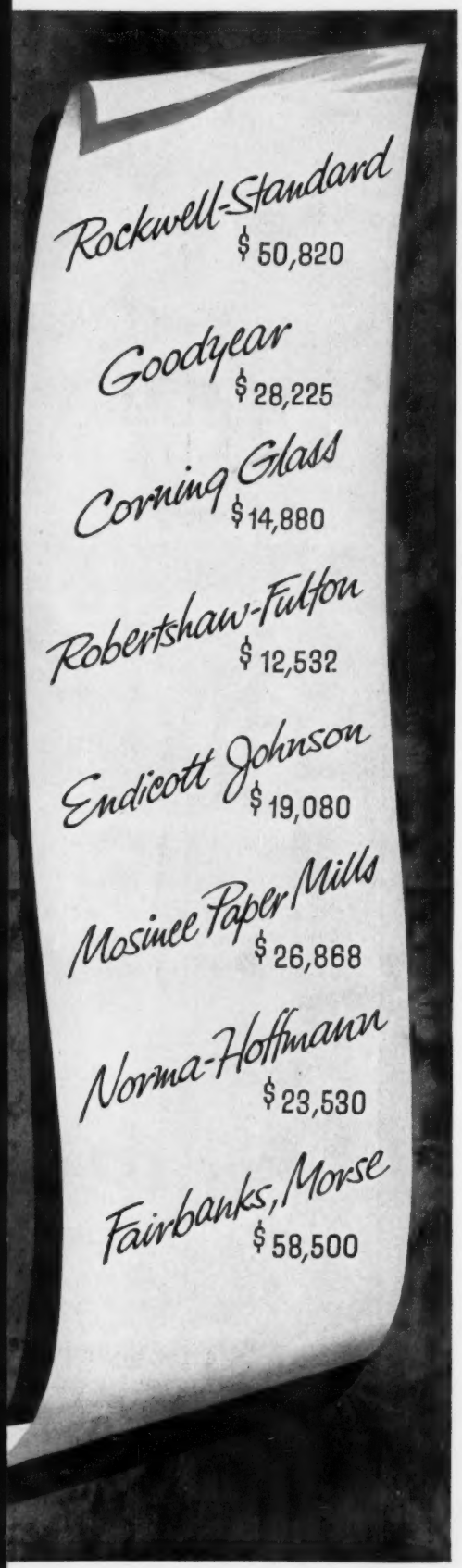

Can savings like these be made in your plant?

A Mobil Program of Correct Lubrication helped these companies save $234,435 in maintenance costs. Find out how it can help you improve your profits.

The dollar-savings shown at left are just a small part of Mobil's proof-of-performance story. We show them here to emphasize that Mobil does not merely *promise* results—a Mobil Program of Correct Lubrication *delivers* in terms of improved production, increased profits and lower maintenance costs. In fact, very often dollar-savings far exceed the purchase cost of lubricants. That's what makes the Mobil program so attractive to management.

Mobil originated the lubrication program idea to solve a basic problem. The finest lubricants cannot deliver their full potential unless they are applied correctly and unless machines are maintained correctly. Recognizing this as an industry-wide problem, Mobil makes available a complete lubrication program . . . offers assistance in 10 vital cost-saving areas . . . brings you the men and methods of Mobil, including such services as in-plant training courses and periodic examination of oil samples.

We have positive proof that the Mobil Program works . . . have you seen the evidence?

Mobil Correct Lubrication

24-PAGE MOBIL BOOKLET

Mobil Oil Company, Room 2000F, 150 E. 42nd St., New York 17, N.Y.

Please send me a copy of your informative booklet.

I am interested in learning how your cost-cutting program can work for me.

NAME_____

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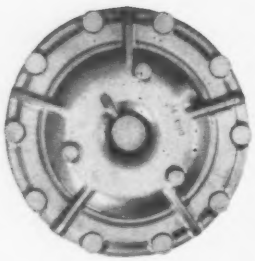
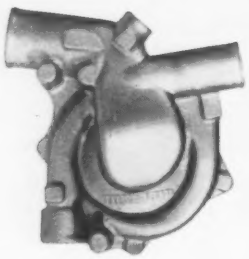
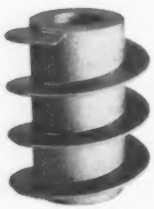
lower production costs with Decatur quality castings







In the highly competitive field of gray iron castings, buyers constantly seek greater reliability at lower cost. They lower costs by using castings which require minimum finishing and have the lowest rejection rate.

Decatur Quality Castings® have exceptionally smooth surface finish comparable to shell or permanent mold castings. When required, precisely controlled heat treating in our furnace gives these castings the uniform metallurgical properties necessary for high production machining. Preparation of unmachined areas is usually unnecessary.

Decatur castings are shipped to your plant in our trucks when quantities permit to insure prompt service.

We are light gray iron and alloyed iron specialists supplying castings weighing a few ounces to 100 pounds.

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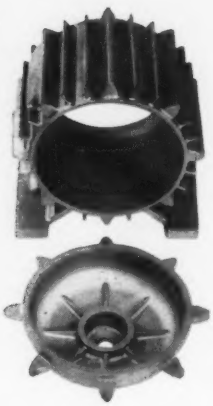


THE DECATUR CASTING CO.

Decatur Quality Castings® Light Gray Iron and Alloyed Iron Specialists
Decatur, Indiana • Phone: Decatur 3-2700

Clark parts being loaded for air shipment . . . five minutes from the Clark Central Parts Depot

Make sure of the service . . . before you buy!

Costs start climbing the minute a fork truck goes out of service. The national average for truck downtime is conservatively estimated to be $16.48 per hour. An important reason why fast, qualified parts service is essential.

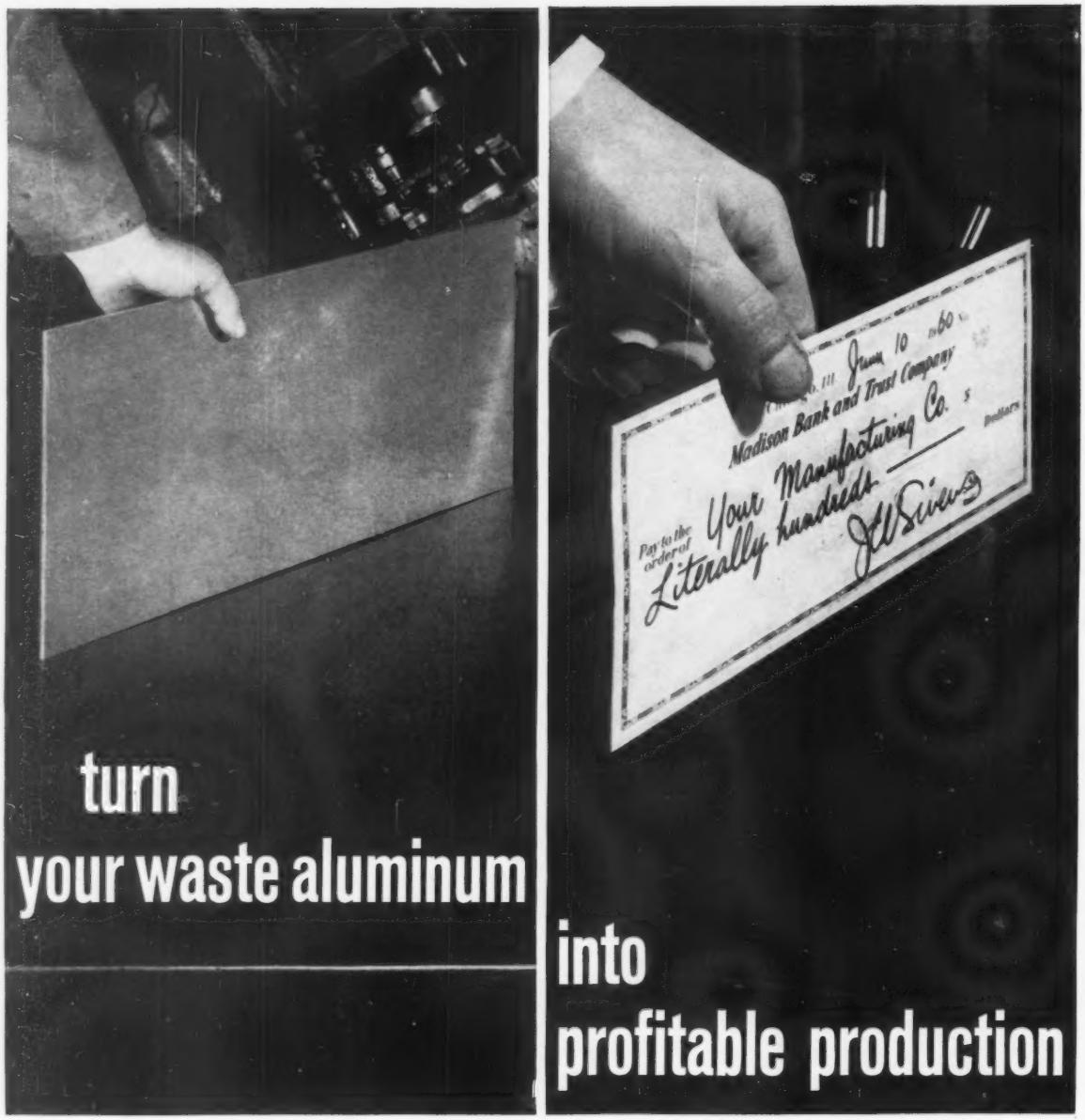
It's why Clark dealers offer you the largest inventory of parts in the industry. It's why Clark maintains a 16,000 mile private wire communication system. It's why Clark has built a multi-million dollar parts warehouse near Chicago's Midway Airport.

Everything in the Clark service system is geared to speed. Vital materials handling equipment must be back on the job *fast!* To assure you of fast service Clark provides you with over 117 service facilities throughout the nation . . . each carrying a complete parts inventory. To back this up, the Clark Central Parts Depot maintains an inventory of over 5 million parts . . . emergency parts that can be air-shipped to any part of the country in a matter of hours. *Only* Clark offers you this service.

Want to see how it's done? A colorful brochure and a film strip describing this service system are available through your local Clark dealer. You'll find him listed in the yellow pages under "Trucks, Industrial." Or, if you prefer, write direct to: Clark Parts Service, Clark Equipment Company, Battle Creek, Michigan.

CLARK® EQUIPMENT

Printed in U. S. A.



turn your waste aluminum into profitable production

You can eliminate scrap aluminum and start getting a *return* on the money, time and labor it took to produce this waste. The Ryerson Aluminum Sheet Plan makes exact lengths and widths available to most users —generally on a *net-weight basis.*

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Sarnoff Predicts Four TV Breakthroughs

Brig. Gen. David Sarnoff, chairman, Radio Corp. of America, predicts: 1. "Satellites will soon serve as relays for global television. The electronic hardware is ready; it awaits only the proper rockets." That system could bring about live, on the spot news coverage of events anywhere on Earth. 2. "Automatic and instantaneous electronic translation techniques are being devised." That'll break language barriers. 3. TV receivers small enough to go in your shirt pocket. 4. The availability of many more TV channels to permit a host of new services.

Management's 'Get Tough Policy' Works

Two Pittsburgh area metalworking companies scored significant victories in new labor contracts last week—after threatening to close down their plants. United Steelworkers at Pittsburgh-Des Moines Steel Co. voted 182 to 98 to accept a 38 cent package over 43 months of a new contract. The firm refused to grant a cost of living escalator clause and supplemental unemployment benefits; the union knuckled under after a 163 day walkout. Members of the International Brotherhood of Electrical Workers voted 71 to 48 to take a 31 month, 16 cent package at Pittsburgh Standard Conduit Co.'s Verona (Pa.) plant—after management decided to move the facility rather than grant concessions on work rules.

Blough Cites Need for Depreciation Reform

Revision of depreciation laws is vital to the maintenance and addition of productive capacity, Roger Blough, chairman, U. S. Steel Corp., asserts in the corporation's annual report issued last week. He notes that the firm spent $366.1 million last year (vs. $448.1 million in '58) for plant and equipment, while depreciation reserves totaled only $189.9 million. The drop in capital spending last year was caused by the steel strike, which disrupted construction, he reports. At the beginning of this year, $695 million worth of capital spending projects had been authorized by the corporation.

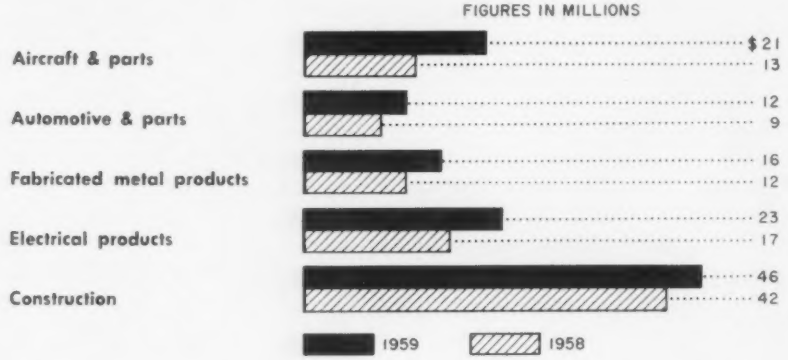
Steel Price Hike Coming, Wheeling Warns

Wheeling Steel Corp. flatly predicted (in its annual report last week) that steel prices will have to be raised because of cost increases resulting from

the new labor pact. It would be better for the economy to have steel prices marked up than to have the steel industry fall victim to a profit squeeze which would deny the opportunity to obtain capital funds for technological improvements and expansion, the report stated. Wheeling is the first steel company to have stated publicly that prices will be hiked. When the labor contract was signed, STEEL predicted a price increase would come around Dec. 1.

Leasing Volume Grows More

Leasing of production equipment is mushrooming—and so is the number of companies getting into the business. Example: The 1958 Chicago telephone directory listed four companies under leasing—machinery and equipment; the 1960 directory lists 19. Nationwide Leasing Co., Chicago, reports that leasing firms had about $116 million worth of office and production equipment on lease to metalworking in 1959. Nationwide supplies this breakdown of leasing volume by industries:



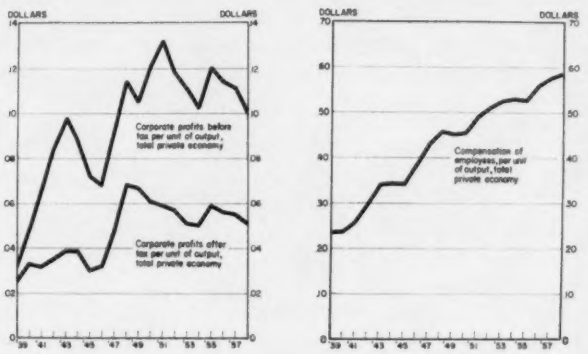
You Can Lease Anything

"There is absolutely no restriction" on the kind of equipment you can lease, says Nationwide. Among equipment it has leased: A refrigerated fishing scow (to California Packing Co.); an automated mail sorting system (for the St. Paul Union Depot); an analog computer (to Humble Oil Co.); air conditioning, sound, and intercommunication systems; and complete equipment and furnishings for a Midwestern hospital.

Canadian Metalworkers Ride Upswing

February brought a new surge of activity to Canadian metalworking, a survey by the Canadian Association of Purchasing Agents finds. One in three PAs said new orders rose; only 9 per cent reported declines. Only 4 per cent reported lower production, while 33 per cent noted improvement. Inventories remained fairly stable. About 28 per cent of the PAs said they were paying higher prices for purchased materials. Plant and equipment expenditures are due to rise above last year's pace: 50 per cent of the PAs predicted higher expenditures; 33 per cent said lower; 17 per cent said about the same. The PAs noted that cold rolled steel products and galvanized sheets are now free of quotas and that deliveries are easing. They reported that European mills have lowered prices to the prestrike level.

As Labor Costs per Unit Climb, Profits per Unit Slide


DOLLARS
DOLLARS
Corporate profits before tax per unit of output, total private economy
Corporate profits after tax per unit of output, total private economy
DOLLARS
DOLLARS
Compensation of employees, per unit of output, total private economy

These charts, prepared by the National Association of Manufacturers, show an underlying cause of inflation: Wages costs per unit of product have risen, pushing unit profits down to the point where further wage costs must be offset by price increases. The charts show that, during most of the last decade, wages have risen at the expense of profits.

Small Computers Permit Decentralized Data Processing

The trend to centralized data processing may be slowed or reversed by the introduction of small units. Fred R. Sullivan, president, Monroe Calculating Machine Co. Inc., shows one such machine—his firm's new solid state, general purpose, computer that will sell for around $27,000. Monroe says this machine can be operated by a typist with less than one day's training. It detects errors and rejects improper data. It operates from a wall outlet (alternating current) and requires no air conditioning.

Government Listens to Export Woes

The U. S. machine tool industry could expand its export volume (about $145 million annually now) if foreign governments relaxed restrictions. That's what builders and exporters told a Department of Commerce trade conference. The department is holding a series of conferences to learn what industry leaders think the government should do to assist in recapturing world markets. Quotas and licensing in Europe were among trade handicaps cited, but the price advantage of foreign manufacturers topped the list of deterrents.

Transistor Import Battle Gets Hotter

The Electronic Industries Association again is demanding an investigation (by the Office of Civil & Defense Mobilization) of transistor and other semiconductor imports. EIA says the imports threaten national security; the Japanese contend they don't. EIA notes that, by 1962, the Japanese expect to produce (at about one-fifth U. S. wage rates) over 200 million

germanium, consumer type transistors per year. It would permit them to capture nearly 70 per cent of the U. S. market for consumer type transistors. EIA says loss of that volume of business will discourage U. S. firms from spearheading further research and development to make better transistors for industrial and military applications.

Straws in the Wind

Total volume of construction (including maintenance) will reach $110 billion in 1970 (vs. $73 billion last year), estimates John A. Volpe, president, Associated General Contractors of America . . . The Justice Department is appealing the court ruling that Du Pont does not have to surrender its General Motors stock . . . Sales of ultrasonic cleaning equipment are likely to triple in the next five years, predicts Branson Instruments Inc. . . . Pittsburgh Steamship Div., U. S. Steel Corp., plans to have its first ore carrier underway during the first week in April . . . Bendix Aviation Corp. will lease its new transistorized data processing system, the G-20, for less than $10,000 a month . . . Birmingham has prohibited the use of foreign steel in public buildings . . . More than 3000 members of the International Association of Machinists struck nine Southern makers of soil pipe last week . . . The National Science Foundation granted Lehigh University $21,670 to develop educational aids for mechanical engineering . . . Dominion Foundries & Steel Ltd. may ship products via the St. Lawrence Seaway (instead of by rail) to Lake Superior ports—using grain and ore vessels that normally travel empty up the lakes.

Survey Shows Business Softening in Chicago Area

A survey by the Purchasing Agents Association of Chicago indicates that the boom is losing some steam in that area. Here's how the respondents compare February indicators with those of January: **Production**—22 per cent say higher; 27 per cent say lower. **Order backlogs**—17 per cent report an increase; 38 per cent note a decline. **Inventories**—39 per cent say theirs are larger; 15 per cent say smaller. **Deliveries**—40 per cent say faster; 1 per cent say slower.

Metalworking Pulse

Steel: Tonnage produced last week dropped to the lowest point since last November. **The Business Trend:** The slight rise in STEEL's index reflects return to closer to normal weather conditions in the industrial Midwest and East. A high plateau is still indicated for the near future. **Autos:** Sales figures continue to bolster confidence in motordom. The March schedule has been raised to 685,000 passenger cars. Only a week ago, it was 666,000.

- **INDUSTRIAL PRODUCTION**
  - Week ended Mar. 12 . . . **178†**
  - Year ago **168**

  Details on Page 113
- **PASSENGER CAR PRODUCTION**
  - Week ended Mar. 19 . **148,000***
  - Year ago **135,466**

  Details on Page 110
- **INGOT PRODUCTION RATE**
  - Week ended Mar. 20 . **91.1%†**
  - Week ago **93.1%**

†Preliminary. *Estimated.

Details on Page 214

This is a MARVEL High-Speed-Edge Hack Saw Blade Cutting a 4" x 4" Titanium Billet

EVERYTHING'S IMPROVED BUT THE GUARANTEE

33 years ago, MARVEL introduced the first welded-edge hack saw blades . . . guaranteed them to be shatterproof . . . and a new concept of power hack sawing came into existence.

In combining, by welding, two materials—a narrow, high speed steel cutting edge, and a tough alloy steel body, MARVEL pioneered the modern hack saw blade.

When operators learned they could apply the heaviest feed pressures and highest speeds to the new MARVEL Blades with complete confidence that they would never shatter or "explode" to cause them personal injury, hack sawing began the approach to its present high level of efficiency. Even cutting "exotic" metals, such as titanium, where heavier feed pressures are a necessity, the MARVEL Blade does an outstanding job and is completely safe.

Today's MARVEL High-Speed-Edge Hack Saw Blades are greatly improved, even over the MARVEL Blades which were the best on the market a few years ago. Advanced metallurgy has produced better steels; new heat treating and manufacturing techniques have brought further improvements. The only thing unchanged is the Guarantee: THEY ARE SHATTERPROOF!

If you haven't used MARVEL High-Speed-Edge Hack Saw Blades recently, try them on your saws for a month and see the difference a truly superior blade can mean in higher speeds, greater accuracy, lower cost per cut, and guaranteed safety to operating personnel. Your nearby MARVEL Distributor carries a complete stock of MARVEL High-Speed-Edge Blades.

Write for Bulletin CT-175 which has complete details on MARVEL High-Speed-Edge Hack Saw Blades.

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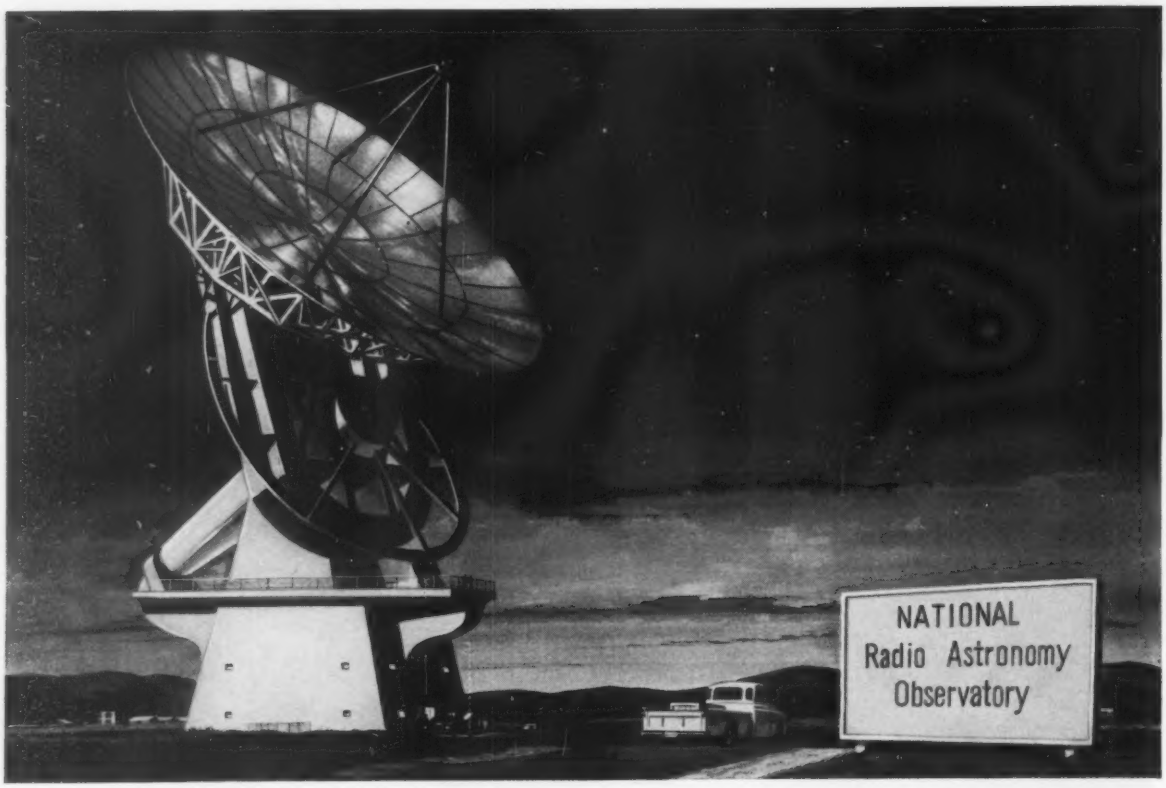
MM&M-PE

MARVEL Metal Cutting SAWS
Better Machines–Better Blades



This radio telescope is now being constructed by the E. W. Bliss Company of Canton, Ohio, at the National Radio Astronomy Observatory at Green Bank, West Virginia. Nickel-alloyed ductile iron is used for support and control parts to achieve watch-like accuracy in guiding the 5-million-pound instrument. The telescope will be operated by Associated Universities, Inc. for the National Science Foundation.

Eavesdropper at the keyhole of an invisible universe

Objects far out in space that cannot be seen with the most powerful optical telescope can now be studied by astronomers.

They do it with an amazing instrument called the radio telescope which can detect radio waves coming from objects that may be as much as *5 billion light years away!*

It may sound fantastic, but that's exactly what this 140-foot telescope at National Radio Astronomy Observatory will do. And although its moveable parts weigh close to 5 million pounds, watch-like accuracy is being built into every foot, every pound.

Take the cannon-like polar axis shaft, which can be seen pointing skyward in the picture. Sixty-seven feet long and 12 feet across, this shaft will be driven by a gear 85 feet in diameter and a foot thick, with teeth machined to be accurate to within thousandths of an inch.

They'll stay accurate, too. For these parts, as well as the 8 bearing pads supporting the massive assembly, are made of nickel-alloyed ductile iron, a remarkable metal developed by Inco research.

It is Nickel which gives this alloy the extra strength and wear resistance without loss of toughness needed for these parts. Unlike ordinary cast iron, nickel-alloyed ductile iron is not brittle. It can be bent or twisted. It is several times stronger than cast iron, yet easy to cast and machine.

Don't forget nickel-alloyed ductile iron even if you're not thinking of building a radio telescope anytime soon. This versatile metal has hundreds of applications in every industry.

So do Nickel and other Nickel Alloys. Be sure to consider them whenever you need a metal with superior ability to withstand destructive service conditions. And don't hesitate to call on Inco for any technical data or other help you may need. Our booklet, *Engineering Properties and Applications of Ductile Iron,* is typical of the informative material that can be yours for the asking. Write for a copy.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street INCO New York 5, N. Y.

INCO NICKEL

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

Depreciation Proposal—

It's a Pig in a Poke

At long last, the U. S. Treasury is making a fumbling move toward depreciation reform. Its proposal includes two steps:

1. Profits from the sale of depreciated property will be treated as ordinary income instead of a capital gain. Most sellers of such equipment would pay a 52 per cent tax on the profit instead of 25 per cent. That's certainly no break for the taxpayer, but to the Treasury, it closes a tax loophole. In return, it is offering a concession:

2. Treasury promises to instruct its Internal Revenue Service agents to show a little more heart. It will advise them to apply Bulletin F less rigidly and to pay more attention to the taxpayers' judgment and practices on depreciation rates and salvage values.

Sounds vague, doesn't it?

Well, it is. Many businessmen are calling it a pig in a poke.

But aside from the tenuous nature of the proposal, we believe it is a totally inadequate approach to the correction of our archaic depreciation policy. It is like treating cancer with an iodine swab.

A complete overhaul job is needed. The government must go that far to give this country depreciation laws and regulations at least as modern and as liberal as those of countries we're competing with industrially.

Two facts must be recognized: 1. Inflation has pushed the replacement cost of equipment far above original costs. 2. Galloping technological progress makes machinery become obsolete much faster than it did when Bulletin F and other depreciation regulations were written.

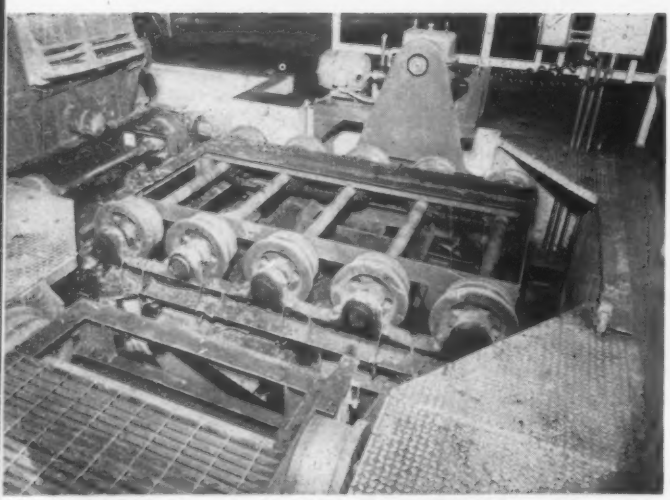
This magazine has led a campaign for bold action on depreciation reform for several years. We believe the situation requires a complete and realistic re-evaluation. We believe the laws and regulations must recognize that plant and equipment consumed are as much a cost of doing business as are wages and other obvious operating costs.

If we are to compete with modernized industries in other countries—countries that have a fantastic labor cost advantage—we can't accept token reform.

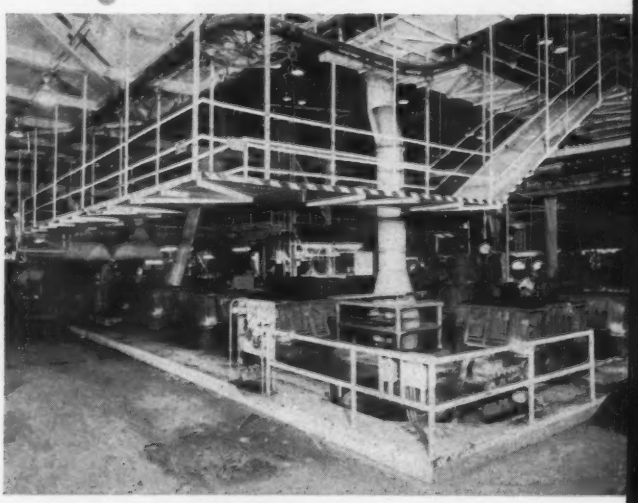
Walter J. Campbell

EDITOR

Logan *Plant Dynamation* paces



Close-up view shows one of the specially designed wheel conveyors mounted on automatic air-driven turntable. System traveled by molds is made up of individually-powered conveyors about this length.



Second turntable occurs midway in cooling zone, dispatches molds toward automatic shake-out. Each conveyor indexes one mold in cascading order, eliminating gaps and synchronizing flow.

Logan conveyors move a nine-ton mold every minute at American Radiator & Standard Sanitary Corp.

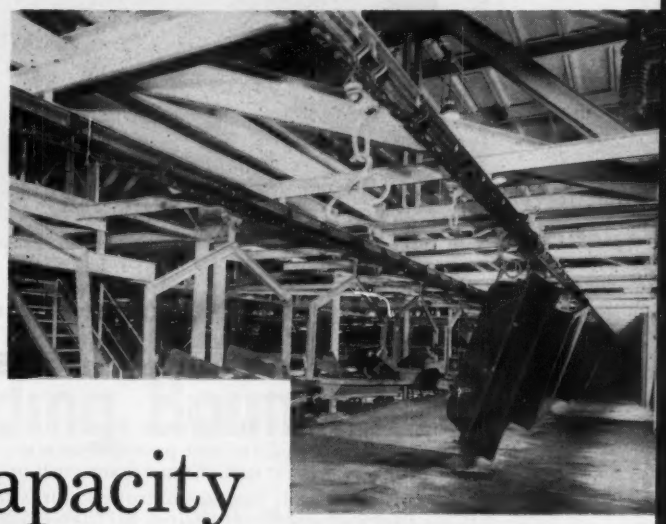
Modern casting equipment offered a high potential rate of output for this new major foundry in Louisville, Ky., but actual capacity would hinge to an important degree on conveyor design.

Large bathtub castings would need to be conveyed safely and rapidly through a U-shaped conveyor system while the metal was in the molten state. Each tub mold (metal, containing flask, and delicate sand mold) would weigh 18,000 lbs. To prevent crumbling, the conveyor ride would have to be exceedingly smooth. All steps on the casting floor had to be synchronized for fast continuous operation.

The Logan conveyor engineer collaborated with foundry equipment specialists to create a largely automatic casting floor system. The production pace achieved was one bathtub casting every minute!

Specially designed heavy-duty live flanged wheel conveyors give the necessary speed and smoothness. Molds glide through the two required turns on automatic air-powered turntables. Gaps between molds in the 256-ft. wheel system are eliminated by automatic indexing. The turntable shown at left has dispatched a mold to the cooling zone—now returns to pick up next mold from the pouring line. Ladles pour during turntable's indexed one-minute cycle.

The U-shaped automatic wheel series runs from the make-up zone to "shake-out," where hardened castings are removed. Two chain conveyors take automatically-removed flask parts quickly back to make-up for re-use.



(Right) After "shake-out," Logan overhead trolley conveyors carry castings through a bridge into blast-cleaning areas in next building.

new foundry to capacity

Logan conveyor design helps harness ALL the work-power potential of your plant

The productive power of today's machinery is tremendous, but a hundred fine machines still may not make a plant. Harnessing and activating all this potential work-power requires both skill and an adequate design concept. It can be a main key to success. Full *dynamation* of the plant comes only through the one right custom-designed conveyor system.

The Logan technique of Plant Dynamation ensures this one right system. The Logan engineer works with you through an exact analysis; then section by section he designs and specifies the conveyor dictated by the special dynamics of your plant.

Over the half-century in which production-line industry itself has grown up, Logan engineers have developed and extended the Plant Dynamation concept. On an average, "The Man From Logan" assigned to your area has participated in 14 years of this vital experience.

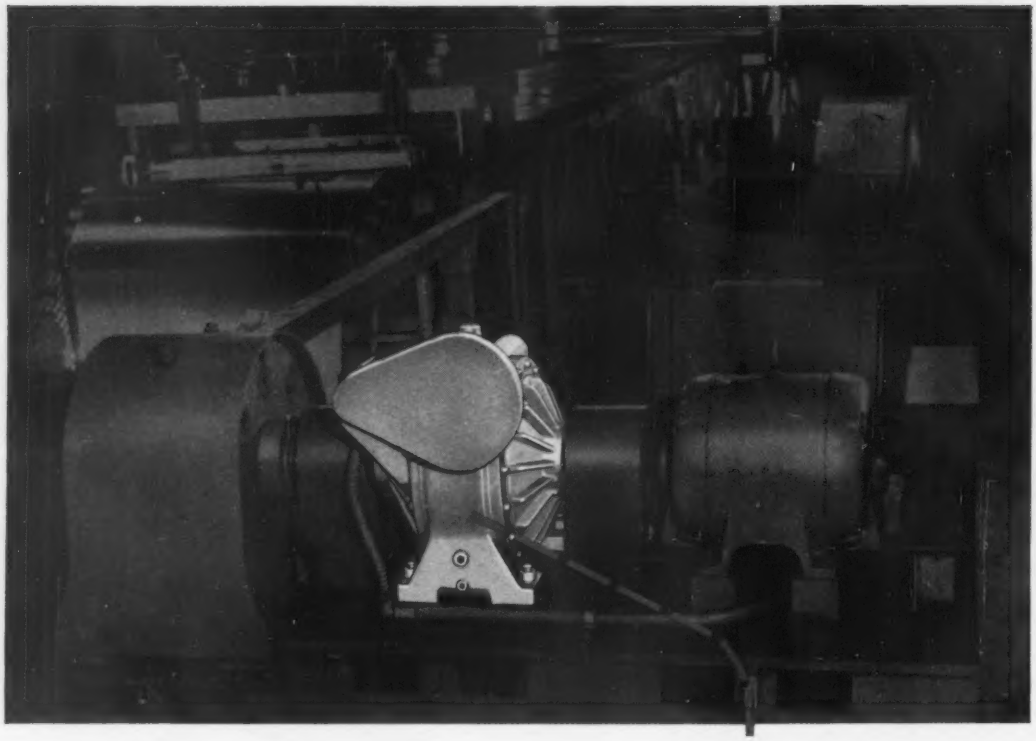
Only a complete-line conveyor company like Logan has the range of products to back up Plant Dynamation. To give your plant its one right system, the Logan engineer specifies freely from equipment in the five distinct modes of conveyor power and control: gravity, electricity, hydraulics, pneumatic devices and electronics.

Logan Dynamation Centers — complete master control centers—are well known in industry. The unusual ability to design complete controls as well as extensive automatic conveyor systems makes the Logan engineer especially valuable where the job requires close collaboration with other engineers.

"The Man From Logan" stationed near you is quickly available. This qualified specialist works with your engineers through design and installation to smooth operation. It is important to consult him early. Write or phone today for a conference on the *dynamation* of your plant.

Logan Conveyors

LOGAN CO., 535 CABEL ST., LOUISVILLE 6, KY.



Processing line speed control no problem . . . thanks to Cleveland Speed Variator

At Armco Steel's Middletown Works, one rugged 7K6 Cleveland Speed Variator provides infinitely variable speed progressions for one of their many steel processing lines.

This electrically remote-controlled unit is shown driving the line's conveyor pay-off reel station. All Clevelands feature simple, precise construction which makes for a compact, quiet-running, instantly-adjusted drive.

If variable speed drives are indicated on your production processes, then Clevelands are the logical choice. Write today for illustrated Bulletin K-200 for complete specifications, sectional drawings and rating tables on the full line of Cleveland Speed Variators.

Cleveland Worm & Gear Division
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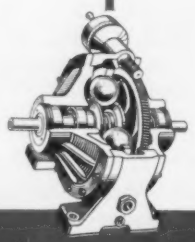
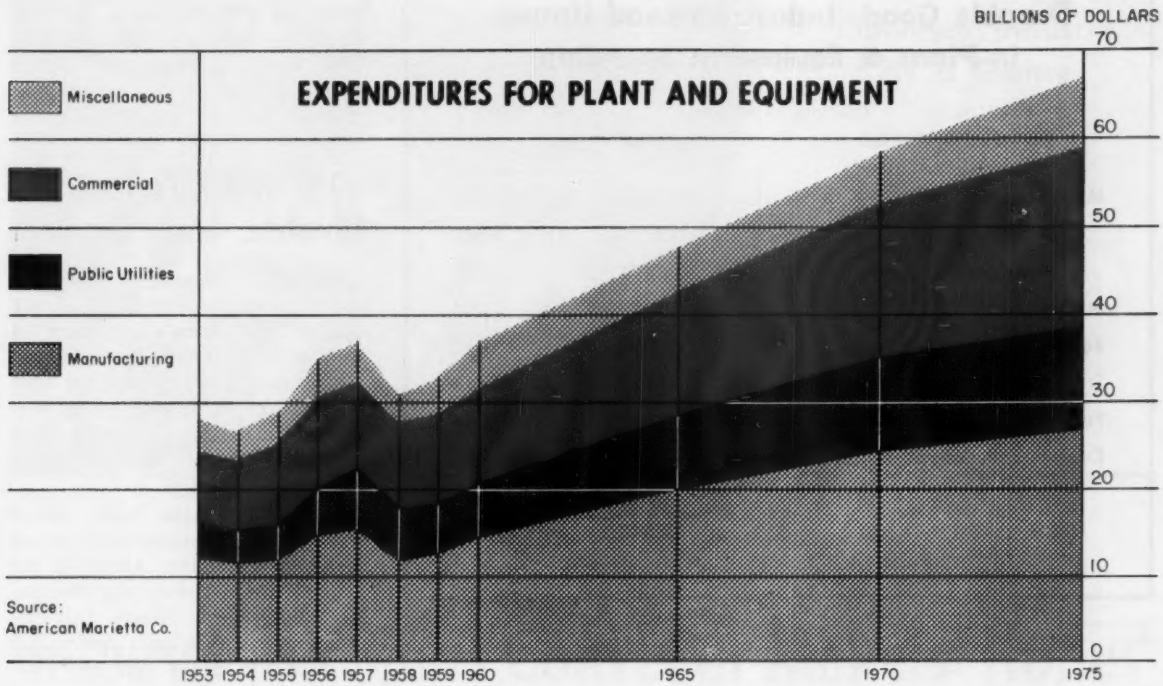
3270 East 80th Street • Cleveland 4, Ohio



HOW IT WORKS

Power is transmitted from input shaft to output shaft through alloy steel driving balls which are in pressure contact with discs attached to the two shafts. Relative speeds of the shafts are adjusted by changing the positioning of the axles on which the balls rotate (see cutaway view, right).

CLEVELAND SPEED VARIATOR



Capital Spending Bounces Back

CAPITAL SPENDING, a key prop in 1960's business prospects, is bouncing back toward the $37 billion record of 1957. Chances are good that it'll hit a new peak which could extend into 1961.

This boost for business optimism appears in the joint Commerce Department-Securities & Exchange Commission annual report on plant and equipment spending. Expected outlays this year will top 1959's by 14 per cent.

The government's annual survey of capital expenditures has been eagerly awaited by economists as the first major measurement of business expectations throughout the year. They call the forecast a ringing vote of confidence in rising business levels.

All major industries are planning to boost spending, and most anticipate a higher rate of expenditure in the second half than in the first. Economists expect that a rising rate of expansion in the last half of 1960 might well extend into 1961.

• Capital outlays by all manufacturing firms will top 1959's spending by 25 per cent.

Manufacturers plan to spend more than $15 billion compared with $12 billion last year. Durable goods producers will boost outlays by 33 per cent; nondurables by 19 per cent. Spending increases, by durable goods industries, include:

Iron and steel	+67%
Nonferrous metals	+19%
Electrical machinery	+43%
Machinery except electrical	+30%
Motor vehicles	+59%
Other transportation	+19%

In nonmanufacturing segments of the economy: Railroads expect to spend 10 per cent more than last year; public gas and electric utilities will increase outlays by 7 per cent.

• Government sources say the rise will support strong business activity but will not kick off an inflationary boom.

They point out that capital goods activity has a powerful influence on all sectors of the economy and usually gathers momentum only after a business upturn is well underway. The current advance began in 1958 and the federal economists hope it will last well into 1961.

Commenting on the Commerce-SEC forecast, Commerce Secretary Frederick H. Mueller says: "All major industries are reporting increases. Of equal importance to me is information that business expects to continue this expansion throughout the year. The increase in plant and equipment spending means more

Durable Goods Industries Lead Upturn in Plant & Equipment Spending

(Millions of dollars)

	1959	1960*
Manufacturing	12,067	15,132
Durable goods	5773	7662
Nondurable goods	6294	7470
Mining	987	1004
Railroads	923	1015
Transp. other than rail	2022	2144
Public utilities	5667	6066
Commercial, other	10,877	11,655
Total	32,543	37,016

*Estimated.
Source: Commerce Department.

business for the industries supplying basic materials and equipment, more employment, and more purchasing power which will find reflection in our markets generally. As a result, we will have a larger and better technical capacity to turn out a wider choice of better quality consumer products, adding further strength to the economy."

The government forecast shows that quarterly spending rates will mount to second half peaks. The agencies expect spending to climb from a $33.5 billion annual clip in the last quarter of 1959 to $35.3 billion in this quarter, then to $37 billion in the second quarter. They predict spending will rise to a $38 billion rate in the last six months of this year and that the increase will result from "a further large rise in manufacturing, notably durable goods."

• Business expectations for rising sales and profits are triggering expansion optimism.

The Commerce-SEC survey reveals that businessmen expect sales for the year to mount well above seasonally adjusted current rates, for a strong rise ahead. Manufacturers look for 1960 sales to exceed last year's by 8 per cent. Durable goods producers expect a 10 per cent jump; nondurable goods industries, 6 per cent.

Analyzing the optimism of the business community, Jules Backman, research professor of economics at New York University, recently told the Associated Industries of Cleveland: "Several factors are stimulating the increase in new plant and equipment. The rise in sales has created an optimistic attitude. In addition, corporate profits have risen sharply and undistributed profits, which are available to finance new plant and equipment, are reaching record totals (see The Business Trend, p. 113).

"Research and development expenditures, which could exceed $10 billion in 1960, also create a demand for new plant and equipment."

In one long look ahead, American-Marietta Co., Chicago, estimates: "Over the past ten years industry has poured a record $290 billion into one vital sector of building—plant and equipment. Great as it is, that rate of capital expenditure will not suffice to meet future needs. Over the next ten years more than $450 billion must be added to plant and equipment to meet the imperative demands of population growth and technological advance." Manufacturing, says American-Marietta, must increase its capital outlays to $20 billion by 1965, and $26.7 billion by 1975 to keep pace with total capital expenditures of $66.7 billion by 1975.

40% of Army's Tools Obsolete, Study Charges

THE RAPID advance in technology threatens to obsolete 80 to 95 per cent of the Army's inventory of tools by 1963 if the present rate of replacement is not speeded up. That was one of the major conclusions reached in the Army's machine tool inventory report done by Johns Hopkins University.

In mid-1958, the Army owned nearly 88,000 machine tools valued at about $1 billion. About 40 per cent of the inventory was obsolete, says the report. Nearly half the equipment was bought during the Korean War and 45 per cent during World War II.

• It will take no less than 30 months to order and get critical tools in the next emergency unless corrective action is taken now, say Johns Hopkins researchers.

The report recommends that the Army:

• Cut down its purchasing from plants with low productive capacity.

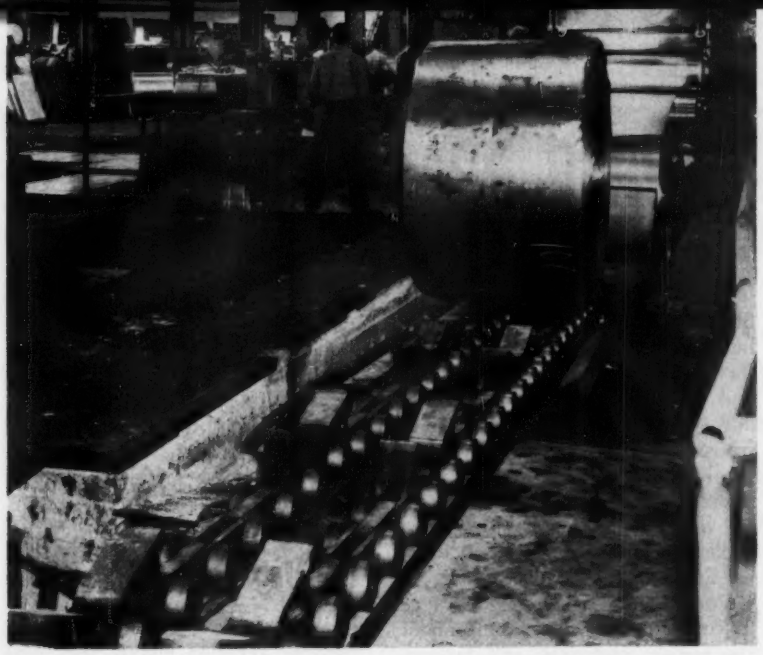
• Concentrate on establishing "efficient, high capacity plants."

• Cut down maintenance expenditures on tools in storage.

• Dispose of tools which are ten years old or older to schools and via foreign aid.

Another recommendation: Industrial plants doing defense work should be encouraged to modernize through accelerated tax writeoffs. Full modernization of U. S. metalworking industries, says the report, would cost $1.5 billion to $2 billion a year over a six year period. It's estimated that $350 million is being spent currently.

The report made this warning: The trend of American machine tool builders to establish connections overseas can in the long term seriously diminish U. S. capacities and skills in this critical sector.



Jeffrey Mfg. Co.

Conveyor Industry At a Glance

- **SALES OUTLOOK**
  Up 15% from 1959
- **INQUIRIES**
  Significant pickup
- **BACKLOGS**
  Up 10 to 15%
- **PRICE OUTLOOK**
  5% increase

Inquiry Push Spurs Conveyor Makers' Hopes

A SUBSTANTIAL UPTURN in inquiries in recent weeks is bolstering conveyor makers' hopes for achieving a 15 per cent increase in sales this year over 1959's.

Says William Hanson, product manager for conveyors, Joy Mfg. Co.: "Because of the steel strike, a number of jobs were held up. In the last month, the number of bona fide inquiries has been astounding. The next three months should be terrific."

At American MonoRail Co., John L. Pischke, president, adds that he has had to add two men to his five man estimating staff to handle the inquiry pickup.

Mr. Pischke says about half of his firm's backlog is composed of completed systems ordered last year. Customers have postponed deliveries until expansion and modernization programs, shelved because of the recession, can be dusted off and brought up to date to meet today's requirements.

Sales so far this year have been disappointing in the light of earlier forecasts. R. C. Sollenberger, executive vice president of the Conveyor Equipment Manufacturers Association, reports: "There's no feeling on the part of the industry that it is entering the golden sixties with a boom. It is mildly optimistic."

• **Inquiry Paradox**—While manufacturers point to the heavy volume of inquiries as their chief hope for a successful year, they also see it as one of their biggest headaches. Several producers tell STEEL that they can hope to clinch orders on only about 1 out of every 5 estimates they make. That represents a terrific loss in engineering work.

L. P. Robertson, vice president of Logan Co., Louisville, explains why: "About 20 per cent of the total cost of a conveyor system represents engineering, and about 15 per cent of the engineering goes into the estimate. Estimating on a $100,000 job can cost as much as $3000." If seven companies bid, that represents $18,000, plus the loss of valuable engineering time, to the unsuccessful six. Several officials agreed that such waste raises overall prices as much as 5 per cent.

• **Solution**—"We ought to be able to recover some of this cost, just as an architect recovers the cost of a losing proposal," declares one official. "If every buyer knew beforehand that he had to pay the losing bidders a fixed percentage of the accepted bid, he would be much more careful about encouraging overbidding."

"I'm not sure of the legality of such a rebate, but I'm sure that some variation could be worked out," comments another executive. "Whenever we hear that more than six or seven manufacturers are bidding on a system, we pass it up. Sometimes as many as 15 companies are encouraged to bid. The waste is disgraceful."

• **Overcapacity** — Another problem plaguing the industry is overcapacity. "There was so much publicity given to the rosy future of the material handling field that literally dozens of companies decided that they would start to build conveyors," laments one Midwestern producer. "It is obvious from the inspection of their financial reports that many of them are not making profits and they won't as long as there is such excess capacity."

That situation has been largely responsible for the relative stability

of conveyor prices in the last couple of years.

• **Prices Will Give**—"If we incur additional labor or material costs, they will be passed on as far as competition will permit," declares Russell B. Maas, president and general manager of Screw Conveyor Corp., Hammond, Ind. Another factor limiting the price increase this year: The level of backlogs. William Sivyer, manager of the Conveyor & Process Equipment Div., Chain Belt Co., Milwaukee, says the industry doesn't have enough at present to strengthen the market materially. However, the consensus of the respondents to STEEL's survey was that prices will climb between 4 and 5 per cent before the year is over.

• **Foreign Threat Grows**—Because conveyors are a highly engineered product, foreign competition has not been a big threat in the last few years. But it is growing. Several Midwestern firms say that systems have been installed "in our backyard" at prices they can't even approach. "Where an outside engineering company draws up the plans and specifications, anybody can produce the equipment. This is where foreigners come in."

"Components are another matter," says Mr. Sollenberger. "Chains from the English and Japanese have been coming in big." And U. S. export markets (estimated by one official as being only about 10 per cent of the total) are meeting rough foreign competition, especially in South America.

• **Close to Record** — Despite its problems, the industry is looking for enough of an upturn to carry shipments close to the $370 million record set in 1957.

• **Double by 1970**—Producers see no reason why the next ten years won't be at least as good as the last ten when sales were doubled. John M. Alvey, president of Alvey Conveyor Mfg. Co., St. Louis, expresses the opinion of many when he ties the outlook to "the trend toward automation and . . . the established fact that material handling in general offers one of the largest opportunities that manufacturers have for reducing costs."

Manned Spacecraft Designs Hit Preproduction Phase

SPACE technology for manned vehicles is moving out of the laboratory into the preproduction phase, and it's fairly certain that military and space agencies have decided to freeze on one or two spacecraft proposals.

Both points were brought out at the first national symposium of the Society of Aircraft Materials & Process Engineers at Dayton, Ohio.

Purpose of the meeting: To give space engineers information about the metals, materials, and production techniques they will need to whip the problem of getting a man to the moon and back safely.

Here is a summary of what they were told:

• Designers must familiarize themselves with: Explosive forming; the welding and brazing of special high temperature metals; new techniques for the forming and fabricating bottles for solid propellents and for handling the whole stable of refractory metals — including molybdenum, tungsten, and columbium.

• Materials must be chosen on the basis of their capacity to withstand re-entry temperatures. Besides the high temperature refractory metals, various coatings may be employed to preserve a structure during air impact—graphite, ceramics, and ceramic-metals, for example. Another: Self-cooling (ablation) materials such as phenolic plastic.

• Structural protection systems must have the ability to cool, resist quick, high temperatures, yet be simple enough to make reasonably fast at a "reachable" cost.

SPACE AGE STETHOSCOPE, called Radfac, enables pilots to give their electronic systems a complete checkup in 60 seconds—even when the testing unit is as far away as 2 miles. The unit (officially known as a radiating facility for aircraft flight line testing) was developed by Republic Aviation Corp., Farmingdale, N. Y.

Phenolic Sales Zip

FIRST of the synthetic plastics, phenolic remains among the most active in today's market. Sales topped 500 million lb in 1959, a gain of 23 per cent over 1958's and more than double those of ten years ago.

Phenolic plastic is "one of the master materials of our time," claims Richard H. Bruce, product sales manager for phenolics at Union Carbide Plastics Co., a division of Union Carbide Corp., New York. "Without phenolic as a dielectric, there could be no electrical, automotive, radio, and television industries as we know them today," he says. In addition to this "hard core of markets" that sustains demand for the plastic, says Mr. Bruce, "about 25 million lb each year go into applications that are entirely new."

Some recent new uses that have boosted demand include handles and connections for electric skillets and steam irons; laminated bases for printed circuits and resin bonds for padding under automobile floor mats and home carpets. All types of molding compounds comprise one of phenolic's biggest markets.

Molding Markets

	1960*	1959
	(Millions of lb)	
Wiring devices	44	44
General electrical devices	40	38
Appliance handles	26	24
Closures	19	19
Auto electrical devices	13	12
Washing machine agitators	12	12
Miscellaneous	77	77
Totals	231	226

*Estimate.

U. S. Steel's Cost for an Hour's Work

(Production, maintenance employees)

	Dollars per Hour Worked		Percentage of Average Job Class Rate	
	1940	1959*	1940	1959*
COST COMPONENTS				
Payments to employees for time on the job:				
Average job class rate	$0.80	$2.43	100%	100%
Cost-of-living adjustment	—	0.17	—	7
Incentive premiums	0.04	0.42	5	17
Premiums for overtime, Sunday, holiday, afternoon & night shift work	0.01	0.24	1	10
Total payments for time on job	0.85	3.26	106	134
For time off:				
Vacations, holidays & jury duty pay	0.01	0.22	1	9
Total payments to employee	0.86	3.48	107	143
Payments for Employee Benefits	0.08	0.52	11	22
TOTAL EMPLOYMENT COST	$0.94	$4.00	118%	165%

*Data for the first half of 1959 are used because second-half data reflect effects of the 116 day steel strike.

U.S. Steel Attacks Wage Inflation

"REVIEW of the relationship of employment costs to inflation in America compels the conclusion that this nation cannot prudently accept endless employment cost increases that outstrip increases in national productivity," says U. S. Steel Corp. in its annual report, adding:

"The inevitable consequences are spiraling prices, mounting government expenditures, multiplying money supplies, and declining confidence in the dollar—in short, a perpetuation of the inflationary excursion on which this nation embarked when it established the legislative and social framework which supports union power behind employment cost inflation."

• **Sound Off**—With more than two months to reflect on the settlement of the steel strike, the chairman of the corporation's finance committee, Robert C. Tyson, says: "Under the recent settlement, the estimated 3½ to 3¾ per cent per year rate of increase in U. S. Steel's own direct employment costs per hour is little less than half the historic rate of increase but is still substantially in excess of any demonstrated rate of increase in productive efficiency."

Costs per manhour at the corporation have trended upward for two decades at an average rate of about 8 per cent per year compounded. The long term increase in output per manhour has been equivalent to only a little more than 2 per cent per annum. Cost-covering increases in prices have resulted, to bridge the gap between those two rates. Finished steel prices, as measured by the Bureau of Labor Statistics, have increased at a rate equivalent to about 5½ per cent yearly since 1940.

• **Fallacy in Federal Figures**—U. S. Steel criticizes Washington's data. "The rapid growth of fringes has made wage rates completely inadequate as an indicator of the cost of an hour's work. Widely quoted government data on average hourly earnings are no longer representative of total employment cost."

The corporation points out that the $4 employment cost in the first half of 1959 (see the table) was nearly 30 per cent greater than the U. S.-compiled wage rate for steel industry production workers. Most of the disparity is due to the government's exclusion of the effects of payments for time off and for employee benefits. The full cost of the steelworker's hour of work at U. S. Steel by the first half of 1959 was 65 per cent greater than the average basic steelworker's wage.

• **Conclusion**—The corporation's report reaches the conclusion that the long term gain in efficiency for the nation as a whole, averaging 2 or 2½ per cent a year, "is the only rate of increase which has any relevancy in judging whether or not any wage increase, wherever initiated, will find ultimate expression in an elevation of general prices."

An aggressive team of young middle managers has helped spark Air Products Inc.'s growth. Conferring with George Pool, executive vice president of AP, are John Stewart (left), general sales manager, and Donald Cummings, general manager, Industrial & Medical Gas Div.

How Air Products Thrives on Oxygen

"GUTS AND A GOOD IDEA will still pay off."

That was the philosophy and main "capital" of Air Products Inc., Allentown, Pa., at the close of World War II when it decided to compete in the steelmaking oxygen market, says Executive Vice President George Pool.

The "good idea" was to build on-site oxygen plants at steel facilities. The "guts" was in bucking the traditional distribution method where oxygen was hauled to the steel mill from other points.

● Success Story—The combination has paid off handsomely. In the short span from 1955 to 1959, sales quintupled from $10 million to just under $50 million. By 1965, the company expects sales to soar to $100 million.

It hasn't been easy though. When the present chief executive officer, Leonard Pool, started Air Products in 1940, he was gambling the infant company's future on his belief that it was sounder to make oxygen at the point of use than to haul it in. But before he had a chance to develop the idea, World War II hit. With it, luckily, came a demand for oxygen to maintain crews on high altitude bombing missions. And because the military couldn't transport the large volume of oxygen cylinders it required all over the world, Air Products developed a portable oxygen plant with a 1 ton a day capacity—really the start of its present business.

Then came peace and with it the cancellation of government contracts. Back to its original goal went Air Products. It began producing on-site oxygen plants, mainly for steel mills (some for medical and miscellaneous industrial use).

For the first few years of its postwar existence, the company produced only small scale units—its largest up to 1949 was 7 tons a day.

Then came the breakthrough! Weirton Steel Co. ordered a 500 ton a day plant to provide oxygen for enrichment of blast furnace air.

"We would have been out of business if this plant hadn't worked," says George Pool.

The facility was successfully completed in 1951. From then on business began to swell.

• **Steel Is King**—The steel industry accounts for better than 80 per cent of the company's industrial gas sales volume.

Air Products expects to have 35 per cent of the entire steel oxygen market by the end of 1961 (and total volume in all markets of over 20 billion cu ft of oxygen a year).

And steel's appetite for oxygen is growing all the time. Right now, Air Products is constructing four facilities that will add 1615 tons a day to oxygen usage by steel mills. Breakdown: Granite City Steel Co., Chicago, 125 tons a day; Weirton Steel Co., Weirton, W. Va., 650 tons a day; Jones & Laughlin Steel Corp., Pittsburgh, 340 tons a day; Jones & Laughlin, Cleveland, 500 tons a day. "This 1615 tons a day of additional oxygen really becomes significant when you realize it is equal to 50 per cent of all the high purity oxygen used by the steel industry in 1958," says Donald Cummings, general manager of the Industrial & Medical Gas Div.

• **Behind Oxygen's Climb**—George Pool explains Air Products' spurting penetration of the steel oxygen market this way:

"We sold the idea oxygen should be manufactured at the point of use because: 1. The cost is much less that way. 2. It would guarantee the user an uninterrupted supply. If it hadn't been for our pioneering efforts, the steel industry probably wouldn't be using nearly the amount of oxygen it does today.

"When we put in the 500 ton a day plant for Weirton Steel, it was able to produce oxygen for 3 cents per 100 cu ft. As a comparison, bulk oxygen being hauled in at that time was selling for 30 to 35 cents per 100 cu ft. Today, on-site plants can deliver oxygen for around 5 cents per 100 cu ft ($12 a ton).

"We further told prospective users our business was making oxygen, theirs was producing steel, and they shouldn't have to be bothered with the mechanics of oxygen recovery. So, for the last few years, the trend has been for us to build a plant for a customer, staff it with our own men, and produce oxygen for him under a long term contract."

Here's How Oxygen Use in Steelmaking Is Growing

Use per ton of steel in cubic feet*	
1930	30
1951	100
1955	175
1956	208
1957	230
1958	338
1959	400
1960	500
1965	1400

*All years except 1956, 1957, 1958 estimated by Air Products Inc.

• **Up and Up and Up** — What about the future? Says George Pool: "Every steel company that wants to stay in business will have to use larger and larger amounts of oxygen in every type of metallurgical operation."

He looks for oxygen usage to spiral in these areas:

• Blast furnace operation through air enrichment to increase production. By adding 4 per cent more oxygen, blast furnace output can be increased by 10 to 15 per cent, says Air Products. An added saving: Less coke is needed.

• Open hearth steelmaking. "The potential is just fantastic," says the company. "For example, in 1958, the steel industry used an average 338 cu ft of oxygen per ton of steel. But the addition of oxygen to open hearths increases usage to as much as 1000 cu ft. Since open hearths account for about 85 per cent of steel production, universal use of oxygen enrichment would double or triple consumption overnight."

• L-D process or top blown converter for steelmaking. "This process is bound to rapidly expand," says George Pool, "because it's the lowest cost method of producing steel, both from the standpoint of labor and capital investment." An L-D converter uses 2000 cu ft of oxygen per ton of steel. (The head of the United Austrian Iron & Steel Works, Walter Hitzinger, recently estimated the L-D process would account for 120 million tons, or 35 per cent of world steel capacity by 1965. In 1958, L-D capacity was 10.2 million tons.)

• Electric arc furnaces. Uses of oxygen for decarbonization will grow, believes Air Products, because of its increasing availability at low cost.

• **More Markets for Gases**—While there's no doubt steel is king in the oxygen market, other markets are taking increasing quantities of industrial gases.

The military market has boomed with the advent of liquid oxygen and hydrogen as propellents for missiles and rockets. Air Products now supplies about 85 per cent of all the liquid oxygen and 98 per cent of all the liquid hydrogen for U. S. space and missile programs.

Metal fabricators are stepping up requirements for oxygen for welding and cutting; argon for welding and inert atmospheres; nitrogen for inert atmospheres, annealing, purging and blanketing; helium for welding; and hydrogen for heat treating.

Chemical, food processing, electronic, and many other industries are increasing both quantities and kinds of industrial gases they need for their operations.

• **Bank on Research**—To keep new and increased uses coming, 3 to 4 cents out of every sales dollar are plowed back into research. Two current projects: 1. To stimulate use of the L-D process in steelmaking by increasing from the present 25 per cent to 50 per cent the amount of scrap that can be utilized in the melt. 2. Separation of 50 per cent of the hydrogen from coke oven gases through on-site plants that would reduce gases to the liquid state, then separate them.

• **What to Expect**—Says Air Products: You can look for bigger and bigger on-site oxygen facilities to be placed adjacent to steel plants as that industry's need for oxygen soars (see table, above).

Also look for growth in demand from the steel and other industries for the whole line of industrial gases.

• You may win $1000 this month. See Servicenter, Pages 5 and 6.

Defense Spending Debate Starts . . . Military Markets to Watch . . . Commerce Reports on Transportation

How Much of GNP for Defense?

Fiscal Year	Gross National Product	Military Spending	% of GNP
	(In billions of dollars)		
1950	284.6	11.9	4.2
1951	329.0	19.8	6.0
1952	342.0	39.0	11.2
1953	365.4	43.7	12.0
1954	363.1	40.3	11.1
1955	397.5	35.5	8.9
1956	419.2	35.8	8.5
1957	442.5	38.4	8.7
1958	441.7	39.1	8.9
1959	478.8	41.2	8.6

Source: Congressional Joint Economic Committee.

YOU'LL be hearing more about the above table in the weeks between now and the Presidential nominating conventions this summer. It is one of the best guides available to anyone interested in really wanting to know how much defense this nation can afford.

Since the Korean emergency, defense spending has been declining in proportion to gross national product, while it has been rising in actual dollar terms. The dollar increase in defense must be adjusted for inflation, but so must GNP.

The "spenders" on Capitol Hill and in industry (and they are not all Democrats) say it is ridiculous to worry about increasing the defense budget by, say, $4 billion in fiscal 1961, when GNP will most certainly pass the $500 billion mark in that fiscal year (ending June 30, 1961). A $45 billion defense budget would amount to just 9 per cent of a $500 billion GNP, a barely noticeable rise over the average of the 1955-59 period. It must also be remembered that defense spending itself contributes directly to GNP growth.

The importance of the current debate to metalworking: Even if Congress doesn't increase the President's defense budget, the ratio to GNP line of thinking is becoming popular in Washington. The 1960s are almost bound to see rising defense expenditures and chances are that it will rise as GNP does. Alert defense marketing managers can start thinking of a $75 billion defense budget by 1970.

The Big Defense Markets of the '60s

It is easy to spot where the tremendous increases in defense spending will come: Space vehicles and satellite systems, intercontinental ballistic missiles, antimissile and satellite programs, the Navy's Polaris submarine, antisubmarine warfare, and, perhaps, a civilian shelter program. All of the measures have been highly recommended by various industry advisory groups to the White House and Pentagon.

Some indications of the big programs ahead: The Interior Department's Geological Survey is mapping the terrain of the moon; the Air Force has decided to go ahead with its Midas (infrared detection) missile warning system; the Navy has received approval for a 45 Polaris sub program (each will cost over $100 million); the Air Force is seeking contractors' ideas on a third generation (after the Minuteman) ICBM; and the Navy thinks it will be allowed significant increases in its $200 million per year antisub project.

Commerce's Transportation Study

The long awaited Commerce report to the White House on the transportation system of the 1960s has been forwarded to affected government agencies for action. The report includes 78 recommendations, 20 of which require legislation by Congress.

The report's theme: To lessen the transportation industry's dependence upon government aid. Commerce Secretary Frederick H. Mueller wants the public "to select the mode of transport that best suits its needs," but he recognizes the need for continued watchfulness against monopoly and destructive competition. Crux: "The recommendations seek to free the railroads, trucking, airlines, and marine industries from obstacles that hinder them from keeping pace with America's growing economy," says the secretary.

Among the recommendations: Eliminate many restrictions on truck lines; stop adding any more parallel airline routes to the present system; provide freedom in pricing policies for all carriers; make the carriers pay for the facilities they use (public airports, for example).

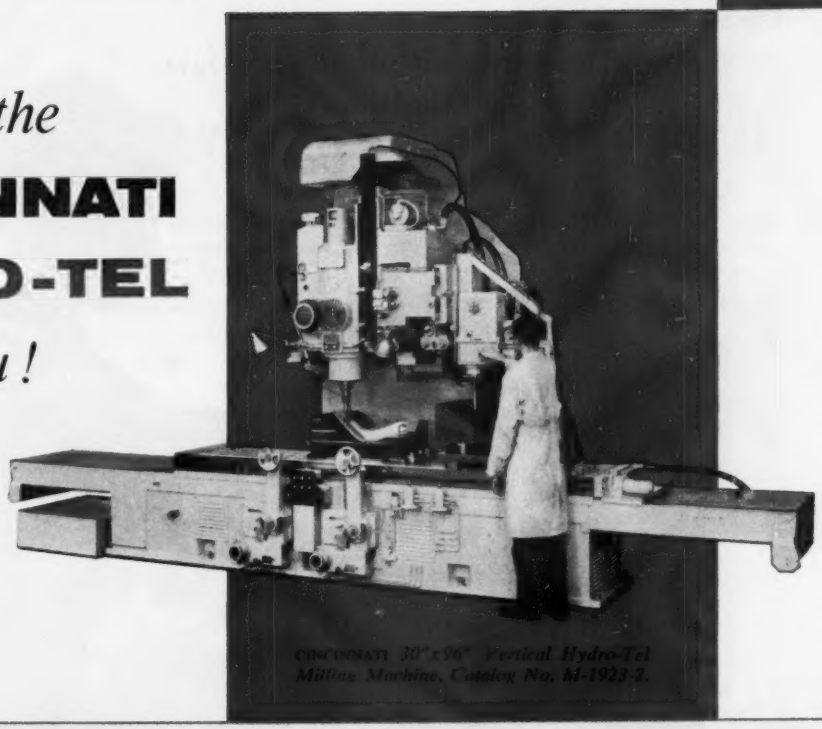
Special mention is made of the railroads' depreciation problem. Adjustments should be made, says Secretary Mueller, to give the railroads the same opportunity to re-equip as other carriers.

CINCINNATI

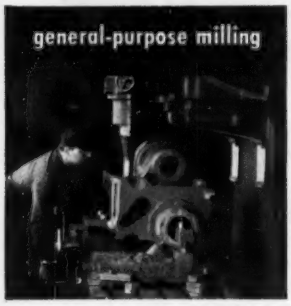
Here's what the

CINCINNATI HYDRO-TEL

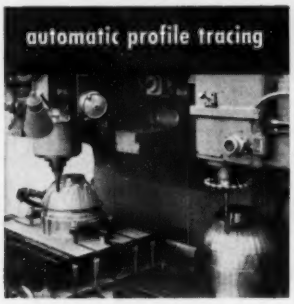
can do for you!



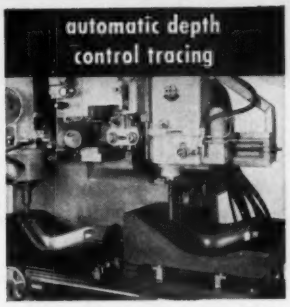
CINCINNATI 30"x96" Vertical Hydro-Tel Milling Machine, Catalog No. M-1923-2.



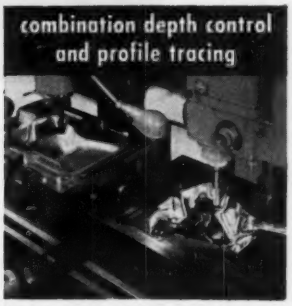
SEVERAL MILLING OPERATIONS *are performed on these large cast iron parts for a milling machine, on a 28" Vertical Hydro-Tel.*



PROFILE OF THE MASTER *(at right) is accurately duplicated on the workpiece — a punch which forms street light shields.*



DIE FOR AUTOMOBILE ARM REST *is cut on a 30" Hydro-Tel (see large illustration above).*



COMBINATION TRACING *of a life-size dress form mold on a 28" Hydro-Tel. This complex part is completed in a single setup.*

For lower costs and greater productivity consider the versatile Hydro-Tels. Basically, these machines are flexible general-purpose millers, rigidly constructed and powered to take a healthy cut. Features include hydraulic activation of all slides, with finger-tip touch manual servo controls; infinitely variable, independent feed rates for table, cross-slide and vertical head (if desired); single lever directional controls for feed and rapid traverse of table and cross-slide; dial selection of spindle speeds. All controls are within convenient reach from the operating position.

Hydro-Tels are even more than efficient general-purpose milling machines: when equipped with standard tracer units they meet the highest requirements of die sinking and production shops. Automatic depth control tracing, 360° automatic profiling and various combinations of these two methods simplify accurate reproduction of the most complex shapes. And a wide array of multiple spindle heads are available to suit your machining operations and production schedules.

Let our Field Engineers explain what CINCINNATI Hydro-Tel Milling Machines can do in *your* shop. For further information write for Catalogs M-1773-3 and M-1923-2. **Milling Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**

KNEE TYPE AND BED TYPE MILLING MACHINES • DIE SINKING MACHINES
• CUTTER AND TOOL GRINDERS • ELECTRICAL DISCHARGE MACHINES

CINCINNATI®
MILLING MACHINE DIVISION

Cadillac Gage gets tight production and labor control...reduces clerical costs by 30% with easy-to-use Automatic Keysort

NEED: fast, accurate management reports for controlling production of ultra-precision units—and a 226-man work force.

COMPANY: Cadillac Gage, leading manufacturer of electric-hydraulic servo valve assemblies for missiles and aircraft.

SOLUTION: the easy-to-use, low-cost machines and punched cards of Automatic Keysort Data Processing.

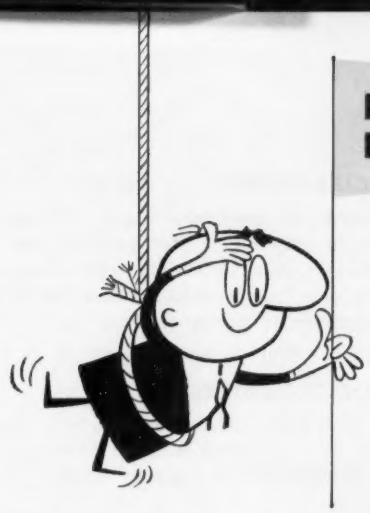
METHOD: Keysort punched cards, mechanically code-notched with required information for rapid sorting, are created as original documents for 1) material planning, 2) job-routing and 3) labor distribution. Upon completion of each job, the accounting department automatically processes the collected information with the Keysort Tabulating Punch—internally coding the cards with actual and estimated time of job. This unique machine then automatically produces a tabulation of variance in work time by work center and order number.

RESULT: with the comprehensive, on-time reports made possible by Automatic Keysort, Cadillac Gage is now able to pinpoint any job in the plant . . . can determine the cost of labor and the total time spent on each job by department and individual clock number. Knowing where they stand, management can act *at once* to correct a profit-losing situation. Best of all, it's done without specialized personnel. Without restrictive procedures. And at remarkably low cost.

For a detailed report on Automatic Keysort Data Processing at Cadillac Gage, call your nearby Royal McBee Data Processing Representative, or write Royal McBee Corporation, Data Processing Division, Port Chester, New York for Case History 977.

ROYAL McBEE · *data processing division*

NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION



. . . How to Find the Money for It

Equipment financing is not solely the responsibility of your moneymen and front office. To do an effective job of proposing and evaluating ideas for new equipment, you must know your company's financial position, sources of capital, and the true cost of financing. Here's the approach to use. . .

YOU PROPOSE buying new equipment to lower unit production costs. Top management shelves the idea (even though they endorse it) because the company can't afford it.

What to do? Money is usually the special problem of top brass. Dare you step into that thorny area? You'll have to, at least part way, to sell more equipment ideas. A general knowledge of the company's financial position will help you tailor proposals to improve chances of acceptance. A sound suggestion on how to finance the equipment purchase may be just as important as a sales pitch on the machine's cost savings.

Financing is seldom easy to get. And it's rarely cheap, especially with today's high interest rates. The matter of money is difficult. Make it easier with this plan of attack:

1. Be sure you really need money.
2. Look into your company's financial position.
3. Know where to go for money.
4. Determine the true cost of financing.
5. Consider alternatives to buying.

Let's examine the ground to be covered with each step. . . .

Is Money Your Problem?

Traditional fears of going into debt keep many managers from buying sorely needed new equipment. Metalworking needs $20.7 billion worth of new equipment today—to regain a competitive position in world markets. Foreign companies are challenging every segment of the industry. The most obvious way to meet the challenge is through sound investment in new production facilities. If you can break the fear of debt in your company, you've removed the major roadblock to the kind of production efficiency that will help you meet the challenge from abroad.

In some companies, the problem is opposite. Managers look upon money as a panacea. They're sure—at least the first time—that more money will solve any problem.

The first step should be a complete review of your operations. (Lending agencies will question you thoroughly anyway, so why not be prepared?) Maybe you can find ways of economizing that will eliminate or reduce your need for funds. Do you have too much money tied up in inventories? Or in accounts receivable? Or in equipment that you're not using? (Maybe you could sell or rent it.) Or in outside investments that pay you much less than financing will cost?

Are you sure you need new equipment for the job? One plant manager told STEEL that top management had already O.K.'d a new equipment purchase when he discovered that the planned job could be handled efficiently by bringing in an old press from another department (where it was seldom used) and rebuilding it.

Know Your Firm's Finances

Dr. F. Robert Shoaf, motivation research consultant and assistant professor of marketing at New York

Where to Look For the Money

COMMERCIAL BANKS

A prime source for short term loans. Will make longer term (usually up to five years) loans to regular customers. Also will work with insurance companies to give long term loans. Your banker is in a good position to advise on financing.

INSURANCE COMPANIES

Offer long term loans independently or with bank participation. You must pass a credit investigation that is just as strict as that made by banks.

EQUIPMENT VENDERS

Offer financing as part of their services to customers. Give you a choice of plans if you can qualify. May give you a break on cost if you're a good customer and good credit risk.

PENSION AND TRUST FUNDS

Interest rates are often attractive, but you must pass rugged tests for acceptability, show that your future is secure.

EQUIPMENT FINANCING FIRMS

Offer programs tailored to your needs and your credit standing, either direct or through venders. Costs can vary substantially.

University, is conducting depth interviews for STEEL to learn why and how equipment is or is not bought. He reports many cases of middle managers who are frustrated by top management's refusal to adopt their proposals for new equipment. Often, it's because the middle manager is asking for investments beyond the scope of a firm's resources.

Take the case of the department manager who wanted to replace a sizable amount of obsolete equipment. He suggested buying an automated line, but had to settle for a few semiautomatic machines. He thought top management made "a bum move." He didn't realize that his company had to borrow the money for the purchase, and it couldn't get the amount needed for the automated installation.

Many such situations arise daily in metalworking. They often lead to dissatisfaction, frustration, low morale, and even the loss of good men—who figure top management just doesn't see the wisdom of their proposals.

Certainly, top management should explain why any idea is not adopted. But you can usually discover it for yourself. Better still, anticipate the reaction to an idea and gear proposals accordingly. The key is a good knowledge of the company's financial position. It's helpful to:

- Know the company's earnings record and have a good idea of profit prospects.
- Know the company's return on sales and the latest sales projections.
- Have a rough idea of how much money the firm can borrow and know about what financing costs.
- Always consider the cost of capital as one of the liabilities in equipment buying proposals.
- Realize the effect that general credit availability has on the firm's ability to obtain financing at a reasonable cost.

It's also wise to have a general knowledge of procedures and problems in departments other than your own. It enables you to make suggestions for changes in other areas of the company that will benefit your own operation. For example, you might help to stretch working capital by looking for ways to speed credit and collection procedures (through faster deliveries, quicker billing, and reduction of complaints that slow payments). Try to reduce inventories and tighten inventory controls. Initiate economy drives and seek unusual sources of money within the plant. Example: In a seasonal industry, check off-season uses for facilities. Propose using the fastest possible depreciation methods (STEEL will report on that subject Apr. 18).

Find Outside Money Sources

"It's a fine idea, but our bank credit lines are too clogged for us to finance that equipment," the president of a medium size metalworking company told his production manager—who had just pro-

INDUSTRIAL DEVELOPMENT GROUPS

Any one will help you with financing if reasonably sure it can get your plant in its area. Interested in firms that will provide employment for extended periods.

SMALL BUSINESS INVESTMENT FIRMS

Set up under 1958 SBI Act to provide individuals and small firms with long term and equity funds. Tax advantages permit them to offer attractive terms. About 70 in number, many specialize in one industry or area.

SBA LOANS

The Small Business Administration can lend up to $250,000 to small firms at reasonable rates, but to qualify, you must show that you can't obtain money from private sources at reasonable rates. Some banks will make loans if SBA shares a portion of them.

EQUITY

Common and preferred stocks are good route if firm is fairly large, or shows unusual growth potential. Consult an investment banker.

VENTURE CAPITAL

Groups and individuals who will assume some risk —usually in return for share of control or high rates of interest.

COMMERCIAL CREDIT COMPANIES

Will buy (discount) notes receivable and accounts receivable, to enlarge your working capital.

FOREIGN INVESTORS

Risk capital is available from countries whose economies are shaky or who work with you in exporting or importing. Watch exact source: It may be foreign competitor intent on establishing a beachhead in U. S.

BUSINESS ASSOCIATES

Your major suppliers or customers may help you over a rough spot if you show how the investment can benefit them. Example: New equipment would give customer better quality, lower cost, or faster delivery.

MULTICOMPANY SETUPS

Join with other firms to set up third firm to handle data processing, research, or production common to all.

UNIONS

Will sometimes give financial aid where sizable loss of employment is threatened. Terms may be flexible and fairly inexpensive, but you run risk of losing some control.

posed buying four new machines that would substantially trim production costs on three of the firm's high volume items.

The production manager, who had a working knowledge of his firm's financial position, had anticipated the reaction. "Might we look into some other capital sources whose services seem to fit our needs?" he asked. He pointed out that insurance companies make many long term loans to companies with total assets of little more than $1 million. And he suggested seeking financing from a trust fund. He got his machines. Moral: A working knowledge of money sources can sometimes serve as a lever in selling ideas to bosses.

Seldom will financing be available from all 15 of the sources that are displayed above for the same purpose at the same time. And the cost of financing will vary greatly. When money is tight, the cost range will tend to widen. Each source will have separate, but closely related, standards for the acceptability of a company's proposition as being a good risk. The smaller company is at a competitive disadvantage in the capital markets, especially when money is tight, but smallness can be overcome by soundness and growth potential.

Bernard D. Cahn, New York lawyer and member of the National Council of Consultants of the U. S. Small Business Administration, lists these dimensions as important in determining the acceptability of a company for investment: Management, earnings, net worth and size of assets, nature of industry and business, earnings trends and growth potential, market factors, and type of capital desired.

William R. Driver Jr., vice president, Chase Manhattan Bank, adds that the size of a desired loan is not the key factor in determining availability or cost. He says term loans are as readily available to small companies that are good customers as they are to big companies. He advises you to look upon your firm's bank balance as "an insurance policy for credit availability."

The Real Cost of Financing

Financing can add up to 50 per cent (or more) to the cost of equipment. And financing charges (or interest rates) can range from 5 to more than 25 per cent. A charge of 10 to 12 per cent is fairly common—although it may not be stated as such.

For example, suppose you borrow $24,000 for one year at 6 per cent

How to Improve Your Bank Relations

YOUR ABILITY to get a bank loan for equipment buying depends in large measure on your relationship with your banker. James F. Bodine, vice president, First Pennsylvania Banking & Trust Co., Philadelphia, told an American Management Association seminar how to improve that relationship. . .

1. Cultivate your banker long before you need money. "Generally, the banker is not an expert in your field. You must educate him about you and your business—in layman's language," says Mr. Bodine. Tell your banker about yourself, your business, your methods of operation—preferably in writing. Give him your financial reports. And be ready to answer these questions:

- What are your products?
- Who's on your management team? What is the background and experience of each? What are their living habits?
- What are sales and earning trends? Are they rising? How rapidly?
- How great is equity in proportion to debt?
- Is there enough capital cushion to absorb unforeseen losses?
- Is inventory turnover clean and in balance?
- Are accounts receivable being paid properly?
- Are cash profits sufficient to meet debt amortization?
- Are trade payments being kept up to date?
- Are salaries, commissions, expense accounts, and dividends reasonable?

2. Open your doors to the banker. Invite him to visit your plant so that he can see your operation.

3. Discuss your future with him. Tell him about new products being planned, new marketing setups, major gains in efficiency. He may ask you to prepare a pro forma (formal) statement. That involves taking the most recent balance sheet and projecting it to show the financial condition if the contemplated program is undertaken.

4. Show why you need the money. Outline exactly what you want to buy and what advantages it will give your company.

5. Show how you'll repay the loan. More and more bankers are asking for cash flow charts or cash projections.

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interest, discounted, and pay it off in 12 monthly installments of $2000 each. The discount (cost) is $1440, so you really are borrowing only $22,560. The average amount of borrowed money you will have during the year is less than $12,000. So the $1440 actually represents an interest rate of more than 12 per cent.

Or consider the cost of financing under the plan of an industrial financing company. Suppose you want $50,000 worth of financing and you want to pay it off over a four year period. You'll pay back $59,000 in this manner: $2006 a month the first year, $1475 a month the second year, $944 a month the third year, and $489.70 a month the fourth year. It represents a yearly interest rate of just under 12 per cent. Since your payments are much higher in the beginning than toward the end of the period, the real cost of financing is greater than if you paid back the same amount in equal installments throughout the four years. But the plan offers this advantage: Your largest payments are made early in the useful life of the equipment —when savings should be greatest.

If you borrow from a bank, you will likely be required to keep on deposit at that bank a sum equal to 20 per cent of the unpaid loan balance. That raises the cost of borrowing since its effect is to give you only 80 per cent of the amount of money on which you are paying interest. Example: You borrow $100,000, but have to deposit $20,000. So you really are pocketing only $80,000.

Raising capital through the sale of equity is expensive also. Paul F. Miller Jr. of Drexel & Co., Philadelphia investment banking firm, points out that the expense of raising new money via public offering of common stock can run as high as 20 per cent of the proceeds. He notes that the cost varies according to the amount of money being raised. Fixed costs are fairly high, so the percentage cost will drop as the amount of money to be raised increases. It can be less than 5 per cent for large firms.

Alternatives to Buying

The middle manager should consider alternatives to buying equipment. The three most common ones: 1. Leasing. 2. Rebuilding. 3. Subcontracting. STEEL will discuss leasing and rebuilding in the next article in this series—to appear Apr. 4.

Production Efficiency

How to Get It on a Shoestring

On Apr. 4, STEEL will delve into leasing, rebuilding, and other approaches to getting better equipment with a minimum capital outlay. For a free copy of any or all articles in this Program for Management (running every other week since Jan. 11), write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this. For details, see Pages 5 and 6.

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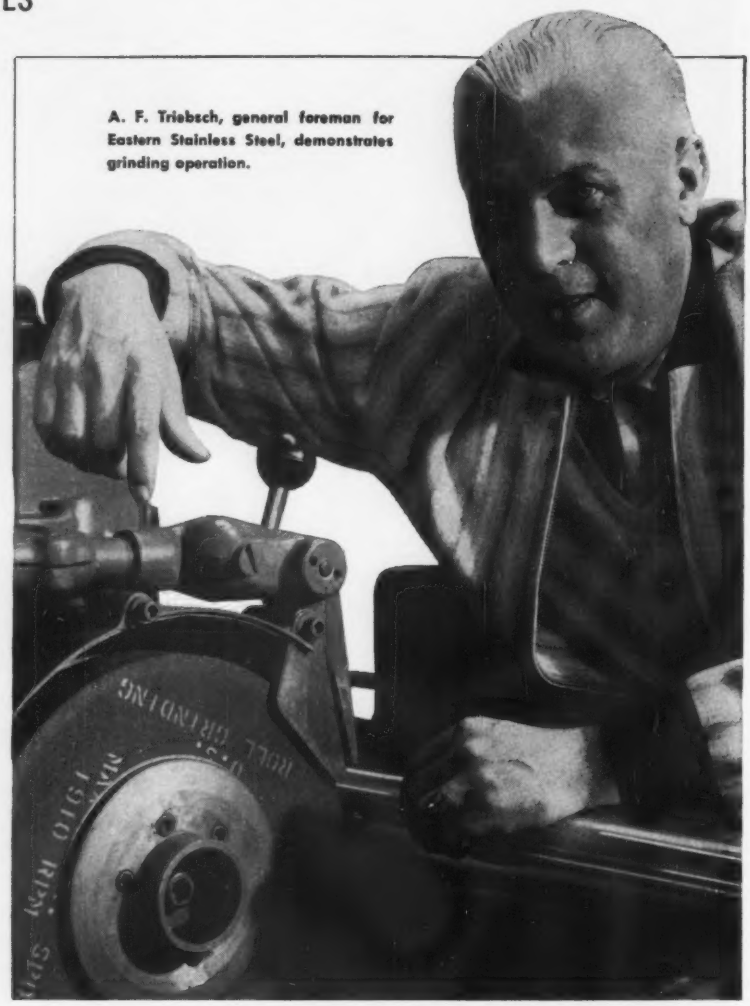
US RUBBER GRINDING WHEELS

NO CHATTER

Production UP 8%!



A. F. Triebsch, general foreman for Eastern Stainless Steel, demonstrates grinding operation.

"U.S." Grinding Wheels help EASTERN STAINLESS STEEL achieve tolerances of 2/10 of .001" in precision work

In producing stainless steel of great precision, the steel passes through a succession of work rolls under a combined force of 59,000 pounds per square inch. All the rolls must be perfectly round and the tiniest defect must be eliminated. To produce a perfectly flat mirror finish, the rolls have to be 2/10ths of .001" perfect!

This is the kind of work Eastern Stainless Steel Corporation turns out every day. To keep their rolls in perfect balance and symmetry they use "U. S." Grinding Wheels. These amazing wheels allow for no "chatter" or vibration, consequently they never groove the roll. Prior to the use of "U. S." Grinding Wheels, at least an hour a day was lost when the operator had to readjust the machine.

Using "U. S." Wheels, Eastern Stainless Steel found many collateral advantages. Maintenance was reduced by more than 20%. "U. S." Grinding Wheels outlast conventional wheels at a ratio of 4 to 1, an obvious saving of 400%.

You, too, can effect important economies and achieve greater precision by turning your grinding wheel problems over to U. S. Rubber.

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Mechanical Goods Division

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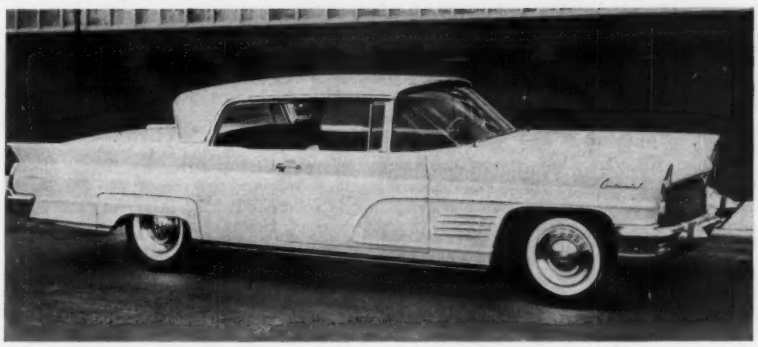
Ford Eyes Luxury Compact Model

SOME people have been saying that Ford Motor Co. will discontinue its luxury Lincoln line in 1961 and replace it with a single series of smaller cars—a fancy version of the Thunderbird. The rumor is false.

The Lincoln-Continental lineup will be changed drastically next year, but the names won't be dropped, and Ford will not vacate any part of the luxury market. The changes may make it even more competitive in the top price group.

With five months to go in the current model year, the company isn't about to discuss new model plans, but the Lincoln-Mercury Div. is making this report to dealers: "Ford Motor Co. will continue to compete aggressively in the high price class market. Lincoln-Mercury Div. will continue to market a product in the luxury market in 1961. The product will be a six passenger car that will have four doors. There is no relationship to Thunderbird either in size or luxuriousness of appointments. The line will be priced to compete with Cadillac and will bear the Lincoln and Continental names."

To verify that thinking, take a look at how sales of luxury cars (total, 219,178) were shared last year. Cadillac latched onto a record 61.7 per cent. Lincoln-Continental came in second with 13.1 per cent. Buick's Electra 225 and Chrysler's Imperial each accounted for 8.4 per cent. The Chrysler New Yorker claimed 7.1 per cent, and the Chrysler station wagon 1.3 per cent. Such market acceptance argues against pushing Lincoln out of the luxury fold.



Rumors are it'll join Lincoln line

Registrations

(Thousands of units)

	Lincoln†	Thunderbird
1959	28.8	71.3*
1958	26.6	45.0*
1957	27.7	15.7
1956	44.0	16.4
1955	35.6	13.6

†Includes Continentals.
*Four seater models.

• **Smaller Car Coming**—Apparently, much of the talk was started because a smaller car will be included in the Lincoln line. It's anybody's guess whether it will be styled along T-Bird lines. Ford Div. people intimate it's a take-off on their popular car. L-M personnel vigorously deny it. Chances are good that the car will follow the concept of the Continental Mark II.

STEEL's sources claim the smaller car (211 in. long) will have a 123 in. wheelbase. It will be offered in two models, a four door hardtop and a convertible. Like its bigger brothers, it will be of unitized construction and reportedly will be backed up with something unique in American car circles—a 30,000 mile, unconditional service guarantee.

To make room for the smaller car, the story is that the Lincoln Premiere line will be phased out.

• **Here's Why**—Part of the reasoning behind Ford's marketing strategy may lie in the registration figures for its luxury cars and the Thunderbird (below). Lincoln and Continental have maintained relatively the same share of the luxury market for some years, but T-Bird's sales doubled with the switch from the two seater sports model to a fancy four passenger car. Autodom suspects there's an untapped segment of the luxury market that can be reached by a car that's between the T-Bird and Lincoln in size. The regular Lincoln line is 227 in. long and built on a 131 in. wheelbase. The 'Bird has a 113 in. wheelbase. It's 205 in. long. A smaller Lincoln with a 123 in. wheelbase would neatly fill the gap.

Ford isn't alone in its thinking. The rumor circuit has it that Cadillac is planning to shorten one of its models 8 in. That would give it one car on a 122 in. wheelbase, which presumably is the base for GM's "B" body for 1961. Chrysler,

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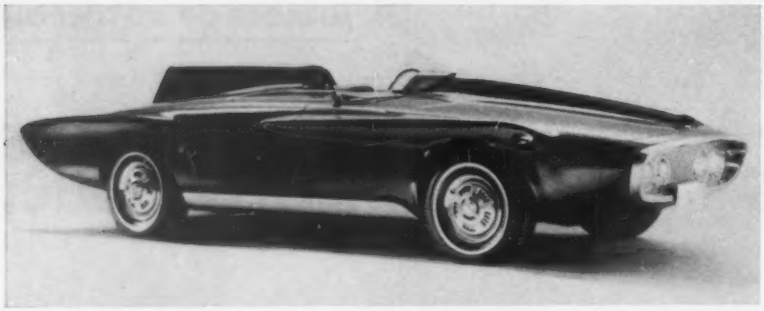

PLYMOUTH'S XNR DREAM CAR may have features that will be incorporated into other Chrysler compacts which are on the designing boards. The frame for the grille also serves as the front bumper. The XNR is built on a 106 in. wheelbase and is 195 in. long. It's 46 in. high at top of the windshield. A standard Chrysler slant six is the powerplant. Virgil Exner, Chrysler's styling vice president, designed the car; the body was built by Ghia in Turin, Italy. Prints of another Exner dream car design are offered as prizes in STEEL's "Beat-the-Experts" contest. (See STEEL, Nov. 16, 1959, pp. 5-6.)

with its 126 in. wheelbase New Yorker and the 129 in. Imperial, apparently figures it doesn't need a more compact offering. It also brought back its Crown Imperial limousine and will build 25 of the 245-in.-long cars this year.

• **Mark II**—It isn't known whether the smaller Ford luxury car will have the Continental or the Lincoln name.

The 218-in.-long Mark II appeared in 1955 as a "contemporary and formal" luxury automobile. Two years and 2500 sales later, it became evident that demand was too limited for the $10,000 job. The Mark II was phased out, and the Continental name was put on a specially styled Lincoln. Facilities were taken over by the special product group creating the Edsel. The Continental has since been consolidated as a Lincoln series.

A luxury compact now seems to fit into Ford's segmented market philosophy. Although the company talks about nine market segments (see STEEL, Dec. 21, 1959, p. 68), it seems to be concentrating on three basic types of cars in varying price groups—compacts, standards, and station wagons.

The compact series starts with the Falcon and may wind up with the compact Continental. The standard lineup begins with Ford cars and stretches up through Lincoln. The third group may eventually include all the company's station wagons. Ford already is promoting its "fine family of wagons" in advertising campaigns.

S-P Extends Foreign Ties

Larks and Studebaker trucks will be built in Chile, Australia, and Israel as Studebaker-Packard Corp. moves farther into overseas markets. The company's 1959 exports were 21.5 per cent above 1958's. S-P believes on the spot assemblies can provide an even larger market.

A facility in Arica, Chile, is turning out Lark four door sedans. The privately owned assembly firm plans to build up other passenger car models and trucks as soon as it can train personnel and expand its plant, reports R. A. Hutchinson, S-P's vice president of overseas operations.

An assembly and manufacturing agreement between S-P and Kaiser-Frazer of Israel Ltd., will make it possible to assemble up to 20 cars daily in KFI's Haifa, Israel, plant. The facility also produces Jeep vehicles and manufactures basic components for tractors, cars, and farm equipment machinery.

The Australian firm of Canada Cycle & Motor Co. Pty. Ltd., Melbourne, has signed an agreement with S-P for the manufacture of parts and assembly of Studebaker cars and trucks. Shipments of parts have already started, and the firm is shooting for 2400 car assemblies a year. Springs, shocks, wheels, bumpers, radiators, and other trim and power train components will be produced in the Australian plant.

Exhaust Notes

• Kelsey-Hayes Co., plans to transfer its wheelmaking operations from its Detroit plant to a former Navy jet plant in Romulus, Mich. The company bought the $54 million facility from the government for $2.6 million. It will add 260,000 sq ft to the plant (cost, $4 million). The company says it's moving because of obsolete facilities at its present plant.

• Farmers purchase 20 per cent of all trucks sold in the U. S. Most of them are pickups, says Prof. Roy Bainer, University of California agricultural professor. He charges that a reduction in truck operating expenses would boost farm profits and points out that farmers have an unused hauling capacity of 15 million lb, representing a $30 million capital investment. Ford Motor Co. has published Professor Bainer's comments as part of its introduction of the Falcon Ranchero pickup. The compact truck (hauling capacity, 800 lb) lists for $1862. Ford claims it can save the farmers (and other operators) as much as $200 per truck per year.

U. S. Auto Output

Passenger Only

	1960	1959
January	688,731	545.757
February	659,323	478,484
2 Mo. Totals	1,345,054	1,024,241
March	.....	576,085
April	.....	578,825
May	.....	546,817
June	.....	557,994
July	.....	555,418
August	.....	239,152
September	.....	258.157
October	.....	507,530
November	.....	254,527
December	.....	494,931
Total	.....	5,593,677

Week Ended	1960	1959
Feb. 13	153,186	115,491
Feb. 20	158,898	120,780
Feb. 27	153,501	127,783
Mar. 5	138,513	133,540
Mar. 12	146,007†	134,283
Mar. 19	148,000*	135,466

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

"Very pleased with all the advantages offered by Tri-Lok. Always prefer shipments to be made in this form due to handling ease, safety and convenience."
NEW YORK SMELTER

"ALCAN TRI-LOK ingots arrive compact and stay compact until we use them. They stack safely, stably—even three or four bundles high. And when straps are cut, they stay in place until fork-lift pickup."
CALIFORNIA EXTRUDER

"We're very enthusiastic about new ALCAN TRI-LOK ingots. Always liked Alcan ingot anyway . . . even more so with Tri-Lok. Mainly from point of view of stacking and handling."
EASTERN EXTRUDER

"TRI-LOK ingots cut our unloading time quite a bit. They don't shift in bundles . . . but stay in place for easy storing and fork-lift handling."
MIDWEST ALUMINUM PRODUCTS MANUFACTURER

Despite the stability of TRI-LOK bundles, there's never a separation problem—*just lift to separate!*

Here are some typical examples of what users are saying about Aluminium's newest ingot development—ALCAN TRI-LOK ingot.

Designed for more efficient handling, the new ingots lock one to another, not in just one, but in three different ways. The resultant stability means greater speed, simplicity and safety wherever ingots are handled.

In car unloading, you find bundles arrive in excellent condition ready for quick pickup by fork lift truck. In-plant moves, too, are greatly simplified because no pallets or special slings are needed. Even after strap removal, TRI-LOK bundles remain securely intact on trucks, floors or inclined ramps.

See for yourself how TRI-LOK ingots improve worker safety . . . save time in carrying, storing and remelt charging. Just telephone or write us today.

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News about the nation's leading steel plate specialist

Helping solve customers' problems is the job of Lukens' Technical Service Department. Here are four members: (left to right) Lou Keay, Metallurgist and Department Manager; Les Dawson and Harry McClure, Welding Engineers; Dick Rote, Metallurgist.

LUKENS EXPANDS SHOP & FIELD TECHNICAL SERVICE

In our shops we test materials for specific jobs. We develop fabricating procedures, welding techniques, flamecutting, forming, machining. We compile data. We keep building a fund of information that can help fabricators make better use of Lukens carbon, alloy and clad plate products.

What our Technical Service Engineers learn in our shop they take into your shop. Before, during and after a job, they're available to assist you.

Lukens has expanded its Technical Service—as we have all our other services—to keep pace with your needs. Write **B-30 Services Building.**

Lukens Steel Company, Coatesville, Pennsylvania.

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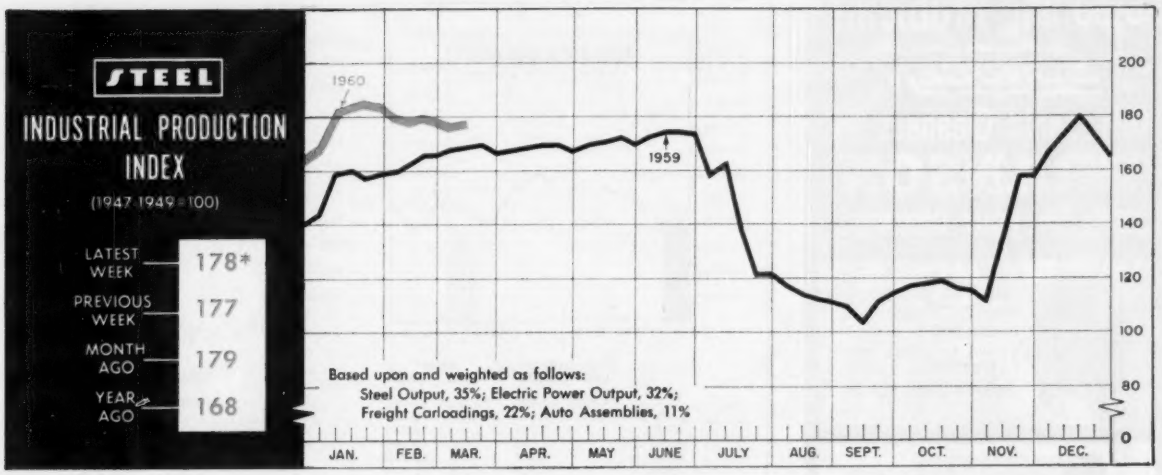
STEEL
INDUSTRIAL PRODUCTION INDEX
(1947-1949=100)
LATEST WEEK 178*
PREVIOUS WEEK 177
MONTH AGO 179
YEAR AGO 168
1960
1959
Based upon and weighted as follows:
Steel Output, 35%; Electric Power Output, 32%;
Freight Carloadings, 22%; Auto Assemblies, 11%
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
200 180 160 140 120 100 80 0

*Week ended Mar. 12.

Economist Sees Improved Second Half

THE SECOND HALF of 1960 is going to be better for business than the first half, predicts Jules Backman, research professor of economics at New York University.

Pushing aside the clouds of economic doubt which have gathered in the last month or two, Professor Backman declares that three potent forces now at work will carry through the second half of 1960 and possibly into next year: 1. A rise in new business investment. 2. Increasing consumer disposable income. 3. State and local government spending.

Opposing them are declining housing starts, high interest rates and tight money, and a shift in our international balance of payments. Federal spending and inventory accumulation appear to be neutral for the year as a whole.

• **Up We Go**—Total expenditures for plant and equipment by the fourth quarter will at least reach the previous record annual rate of $37.75 billion set in the third quarter of 1957, the economist claims. And the momentum could carry over into 1961. (If so, it follows that the economy will continue to ride high for at least another year, because spending for plant and equipment historically has upheld the latter stages of the up side of economic cycles.)

He bases his prediction on five factors: 1. Rising sales since the end of the steel strike have created optimism in the business community. 2. Corporate profits are heading for an all-time peak. 3. There is a large cash flow from depreciation charges which can be used for financing new plants. 4. Research and development, also heading for a new high, create a demand for new facilities. 5. Rising labor costs make it more attractive to substitute machinery wherever possible. (For more on plant and equipment spending, see Page 93.)

• **Local Spending Strong** — State

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,597[1]	2,654	2,631
Electric Power Distributed (million kw-hr)	14,100[1]	14,262	12,996
Bituminous Coal Output (1000 tons)	7,605[1]	8,315	7,890
Crude Oil Production (daily avg—1000 bbl)	7,125[1]	7,153	7,127
Construction Volume (*ENR*—millions)	$284.5	$505.6	$372.1
Auto, Truck Output, U. S., Canada (*Ward's*)	185,046[1]	175,137	168,020
TRADE			
Freight Carloadings (1000 Cars)	570[1]	558	595
Intercity Truck Tonnage (changes from year ago)	−6.9%	−1.6%	+12.6%
Business Failures (Dun & Bradstreet)	299	277	288
Currency in Circulation (millions)[3]	$31,613	$31,516	$31,215
Dept. Store Sales (changes from year ago)[3]	−17%	−7%	+5%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$22,378	$27,478	$22,945
Federal Gross Debt (billions)	$290.5	$290.6	$285.0
Bond Volume, NYSE (millions)	$33.1	$32.5	$37.9
Stocks Sales, NYSE (thousands of shares)	15,980	16,240	21,187
Loans and Investments (billions)[4]	$102 7	$102.8	$103.2
U. S. Govt. Obligations Held (billions)[4]	$25.4	$25.5	$33.2
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	231.1	234.4	220.9
All Commodities[7]	119.7	119.4	119.3
Commodities Other than Farm & Foods[7]	128.5	128.5	127.7

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,84v,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

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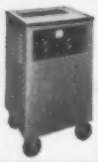
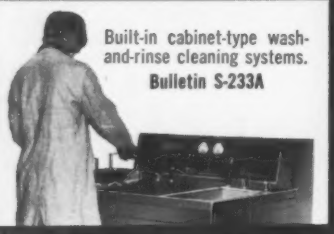


½-gallon and larger benchtop models, and (illustrated) 5- and 12-gallon self-contained rollaround units.
Bulletin S-509, S-217B



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Bulletin S-233A

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Bulletin S-236

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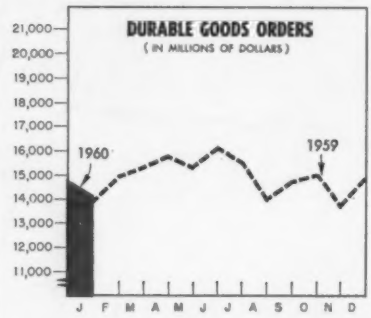
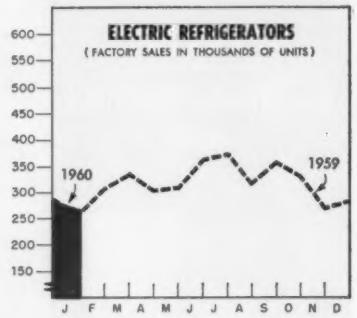
THE BUSINESS TREND





	New Orders* 1960	New Orders* 1959	Sales* 1960	Sales* 1959
Jan.	14,231†	13,900	15,352†	13,541
Feb.	.....	14,918	.....	13,870
Mar.	.....	15,323	.....	14,400
Apr.	.....	15,796	.....	15,166
May	.....	15,241	.....	15,515
June	.....	16,133	.....	15,771
July	.....	15,493	.....	15,384
Aug.	.....	13,974	.....	14,008
Sept.	.....	14,747	.....	14,113
Oct.	.....	15,099	.....	14,047
Nov.	.....	13,721	.....	13,479
Dec.	.....	14,757	.....	14,975

*Seasonally adjusted. †Preliminary.
U. S. Office of Business Economics.
Charts copyright, 1960, STEEL.

	1960	1959	1958
Jan.	266,700	256,200	206,100
Feb.	.....	306,200	227,800
Mar.	.....	333,700	261,100
Apr.	.....	301,000	210,800
May	.....	308,200	262,900
June	.....	361,000	316,300
July	.....	370,800	279,700
Aug.	.....	314,100	245,900
Sept.	.....	355,700	295,200
Oct.	.....	329,600	277,500
Nov.	.....	265,900	245,500
Dec.	.....	282,600	286,900
Totals	.....	3,785,000	3,116,700

National Electrical Mfrs. Assn.

and local expenditures for such things as schools, roads, hospitals, and services are continuing to rise at a rate of better than $3 billion a year. He sees no halt in that trend.

• **Consumers Well Heeled**—"The most important factor determining consumption spending is the level of incomes," Professor Backman declares. And that level is bounding up. A rise of $10 billion to $15 billion is probable this year in disposable personal income. It will result from high wage rates, greater corporate dividends, and better interest rates on savings.

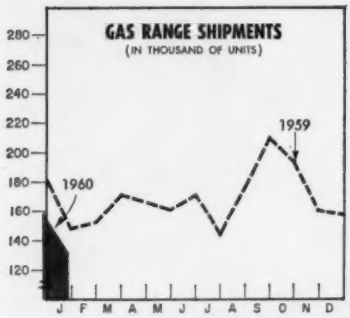
• **Neutral Forces**—The federal government cannot be expected to be any better than neutral in the business picture over the next year or so. On balance, it "will take more in taxes from the economy than it spends." It might even exert a "mildly deflationary influence."

Because "businessmen have adopted a policy of cautious optimism and appear to be avoiding the accumulation of excessive inventories," the rate of rebuilding stocks has already eased off the near record pace following the settlement of the steel strike. "The most important result of this more sensible inventory policy," Mr. Backman asserts, "should be to stretch out the period of high level economic activity. While economic activity will rise at a slower rate in the months ahead, a painful inventory recession will be avoided later on."

Several factors are responsible for the anticipated slump to about 1.2 million housing starts this year, he says. Mortgage money not only is in shorter supply, but it's also more expensive. The level of new family formations is close to its post-World War II low. Cost of residential construction has risen about 4 per cent over the last year. Vacancy ratios have risen to about 3 per cent for all housing. Doubling up is less than 3 per cent of the available housing, the lowest on record.

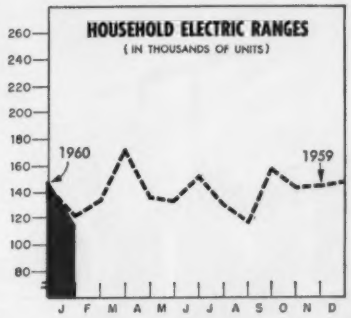
Even though he thinks the credit pinch and tight money are near a peak, he still feels that the money picture will remain a negative factor throughout 1960.

Intensified foreign competition has been partly responsible for the reduction in our gold holdings from $22.9 billion at the end of 1957 to $19.5 billion at the end of 1959. At the same time, foreign balances held in this country have increased sharply. "We have not yet reached



	Shipments—Units		
	1960	1959	1958
Jan. ..	132,100*	148,700	128,200
Feb. ..	.....	152,400	134,200
Mar. ..	.....	171,200	149,300
Apr. ..	.....	166,700	148,200
May ..	.....	160,300	147,200
June ..	.....	170,900	155,900
July ..	.....	143,700	129,100
Aug. ..	.....	176,100	157,700
Sept. ..	.....	210,300	182,300
Oct. ..	.....	194,500	212,200
Nov. ..	.....	159,600	171,200
Dec. ..	.....	157,100	181,000
Totals .	.....	2,010,500	1,896,500

*Preliminary.
Gas Appliance Mfrs. Assn.



	Total Factory Sales—Units		
	1960	1959	1958
Jan. ..	113,500	120,800	109,000
Feb. ..	.....	134,600	108,700
Mar. ..	.....	172,600	117,900
Apr. ..	.....	136,100	95,600
May ..	.....	133,400	96,000
June ..	.....	151,400	116,800
July ..	.....	129,200	98,500
Aug. ..	.....	116,600	81,400
Sept. ..	.....	157,200	122,300
Oct. ..	.....	143,400	135,100
Nov. ..	.....	144,000	129,100
Dec. ..	.....	147,500	144,000
Totals .	.....	1,686,800	1,354,400

National Electrical Mfrs. Assn.

a critical point," Professor Backman believes. "However, a continuation of recent trends would lead to a growing concern about the stability of the dollar."

Firm Plots 1960-75 Growth

A year-long study just released by American-Marietta Co., Chicago, reveals that by 1975 the nation's economy will be nearly equal to two U. S. economies of the 1959 size in terms of tonnages and yardages of output. The gross national product (in today's dollars) will be $925 billion. (The annual rate this quarter is close to $500 billion.) Incomes should increase by 50 per cent, and the total purchasing power of families with incomes over $10,000 a year should equal the entire consumer market today.

Other startling findings:

Total industrial production (Federal Reserve Board's index) will rise to 160 (1947-49=100) this year and will reach 340 by 1975.

Personal consumption expenditures will rise from $310 billion in 1959 to $320 billion this year and $575 billion in 1975.

Fifteen years from now, births will number 5.9 million a year. There will be 55 million more persons in the U. S., and the school age population alone will require expenditures of $36 billion to provide 900,000 additional schoolrooms.

New housing to meet the population demands will rise to 1.7 million units annually, and it will take 100,000 shopping centers to service the 15 million new homes.

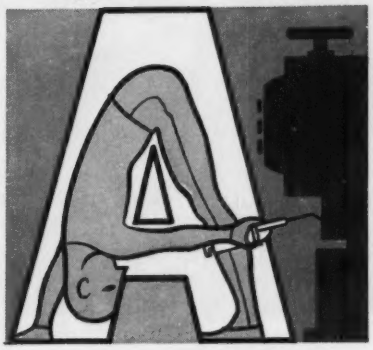
Spending for research and development will rise from $12.4 billion last year to $27.8 billion in 1975. Over the next 15 years, the total will exceed $250 billion. (Only $85 billion has been spent for R&D since 1941.)

Industry has spent $290 billion for plant and equipment in the last ten years. During the next ten, it will have to spend $450 billion to keep up with the demands of population growth and technological advance. From last year's total of $32.5 billion, such spending will climb to $36 billion this year and reach $66.7 billion by 1975.

The pace of urban renewal (246 projects now underway are valued at $2.56 billion) may be accelerated as much as ten times in the next 15 years.

Total new construction will mount from today's annual rate of around $55 billion to $137 billion in 1975.

Your lubrication requirements...



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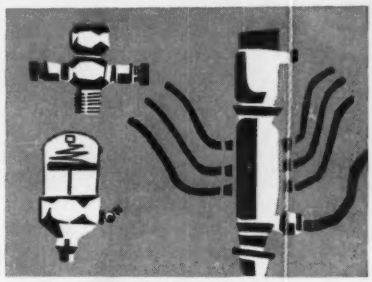

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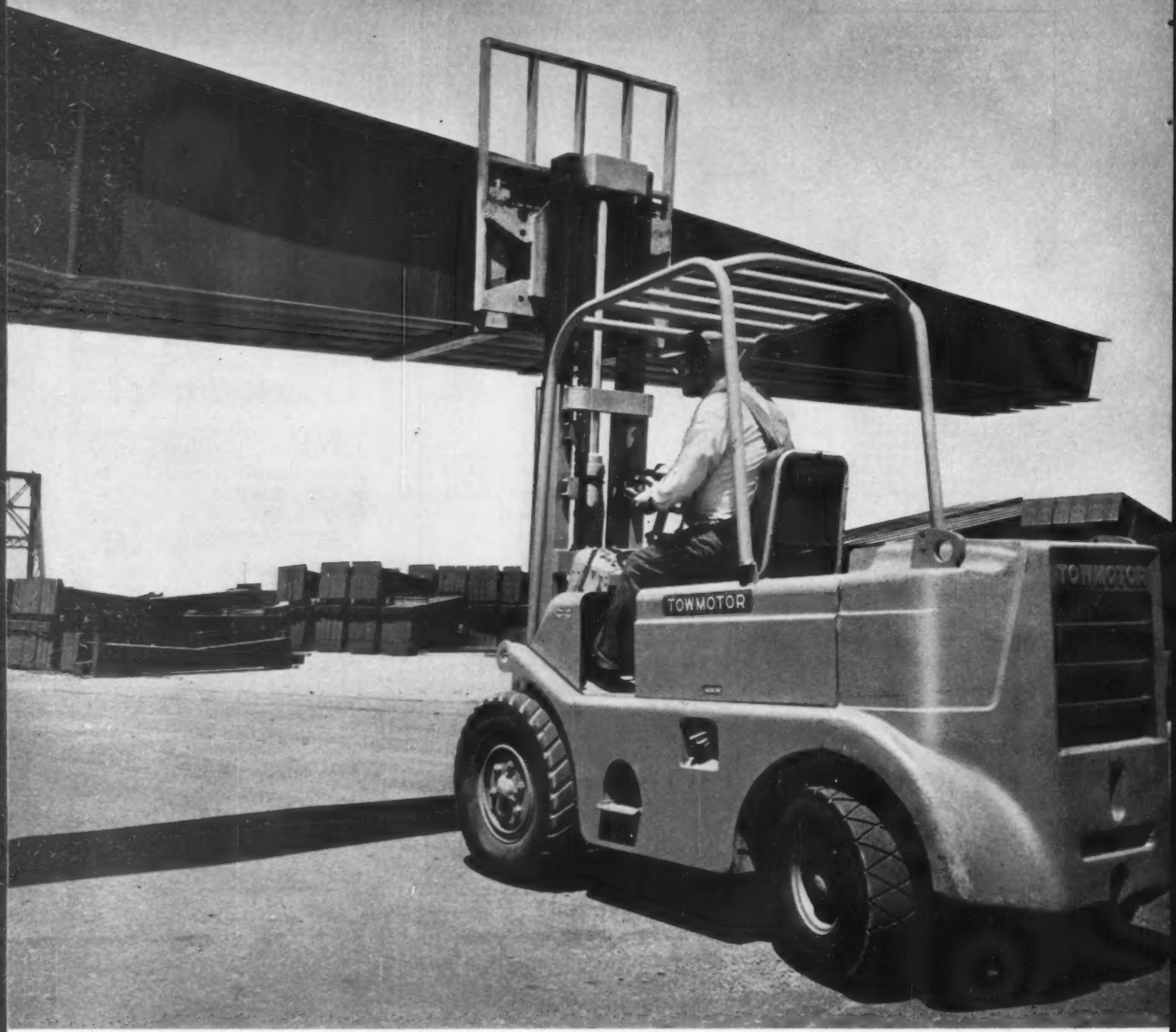

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Sleeper & Hartley v. p.

J. LEONARD HOUGH
Republic plant-chf. eng.

JAMES W. HALLOCK
Albion Malleable v. p.

W. M. WALLACE
heads new A-C division

Frank S. Russell was promoted to vice president of **Sleeper & Hartley Inc.**, Worcester, Mass. He is in charge of sales.

J. Leonard Hough was made chief engineer of **Republic Steel Corp.'s** Youngstown steel plant. Former assistant chief engineer, he succeeds **John Stouffer**, retired. **Harold E. Freeland** was made superintendent of the blooming and billet mills at the Warren, Ohio, plant to succeed **J. P. Van Fossan**, retired.

W. C. Purple Jr. was named to the new post of vice president-production at **Melpar Inc.**, Falls Church, Va., subsidiary of Westinghouse Air Brake Co.

Robert G. Lambrecht was elected vice president-general manager, **Automatic Spring Coiling Co.**, Chicago.

R. J. Conroy, former Los Angeles district office manager, was made assistant sales manager of **Whitman & Barnes Div.**, United-Greenfield Corp., Plymouth, Mich.

C. Eric Ho was made manager of catalyst sales and development at **Climax Molybdenum Co.**, New York, division of American Metal Climax Inc. He was assistant director of marketing research.

Robert F. Lutz was made factory manager, **Bosworth Steel Treating Corp.**, Detroit.

James A. Carter was made general plant superintendent of **Pitney-Bowes Inc.**, Stamford, Conn.

Albion Malleable Iron Co., Albion, Mich., appointed **James W. Hallock** vice president-sales, and **Dr. Franklin B. Rote** vice president-technical director. **Arnold A. Behling** was named controller.

Fred L. Brewer was made general purchasing agent for productive materials of **A. O. Smith Corp.**, Milwaukee. **Wayne G. Thorstensen** was named to succeed Mr. Brewer as assistant to the director of procurement.

Arthur J. Welch was elected president and general manager, Spring Div., **Borg-Warner Corp.**, Chicago. He succeeds **Harry P. Troendly**, advanced to chairman of the division's supervisory board to permit more time for his previously assigned duties as group vice president of Borg-Warner. Mr. Welch was executive vice president and general manager.

Orren S. Leslie was made manager of manufacturing, Automotive Div., Chicago, **Young Spring & Wire Corp.**

John E. Meyers was named marketing manager, Sound Control Dept., Metal Products Div., **Koppers Co. Inc.**, Baltimore. He was Mid-Atlantic sales district manager of the division.

Gordon Cavanagh was made product manager for Alumoweld, **Copperweld Steel Co.'s** new aluminum-covered steel wire and strand. He remains at the Wire & Cable Div. headquarters at Glassport, Pa., where he was development engineer.

Allis-Chalmers Mfg. Co., Milwaukee, combined its Industrial and General Products Divisions into a new operating unit called Industrial Equipment Div., with **W. M. Wallace** a vice president and general manager of the new division. **G. A. Saar** was made assistant general manager.

Kenneth C. Moulton, former general sales manager for Daystrom-Weston Sales Div., Daystrom Inc., was named director of marketing for **Beckman Instruments Inc.**, Fullerton, Calif.

Joe Bender was made sales manager, **Pilgrim Drawn Steel Div.**, Plymouth, Mich., Automotive Materials Corp.

Charles Sundstrom succeeds **C. E. Conway**, retired, on the Pittsburgh district sales staff of **Vulcan-Kidd Steel Div.**, H. K. Porter Company Inc.

Robert G. Hampel was made manager of **Aluminum Co. of America's** Equipment Development Div., Pittsburgh.

S. Paul Burns, former vice president and chief engineer, **Pioneer Engineering & Mfg. Co. Inc.**, Detroit, was named executive vice president.

Harold A. Cohn was elected vice president in charge of the **Alpha-Loy Div.**, Chicago, of Alpha Metals Inc. Joining the firm in 1953, he assisted in setting up the Midwest plant he now heads.

Alloy Metal Abrasive Co., Ann

DONALD W. LASELL
Columbia-Geneva Div. gen. supts.

EDWARD C. KINYON
Columbia-Geneva Div. gen. supts.

CARL F. SCHAEFER
Norden Div. managers

ERNEST J. GREENWOOD
Norden Div. managers

Arbor, Mich., named **Roy W. Olsen** Western sales manager; **C. P. Vogel** Eastern sales manager.

Donald W. Lasell was made general superintendent of the Pittsburg, Calif., plant of **Columbia-Geneva Div.**, U. S. Steel Corp. **Edward C. Kinyon**, former superintendent of sheet finishing at Pittsburg, succeeds Mr. Lasell as general superintendent of the division's Torrance Works in Southern California.

Lt. Gen. James M. Gavin (USA, ret.) was elected president of **Arthur D. Little Inc.**, Cambridge, Mass. He succeeds **Raymond Stevens**, now chairman of the executive committee.

Claude J. Neville, former executive vice president and treasurer, was elected president and general manager, **C. O. Bartlett & Snow Co.**, Cleveland. He succeeds **H. S. Hersey**, now chairman. **John R. Hersey** was elected vice president and treasurer, and **F. W. Neville**, purchasing director and assistant secretary.

At United Aircraft Corp.'s **Norden Div.**, Stamford, Conn., **Carl F. Schaefer** was named engineering manager and **Ernest J. Greenwood** operations manager. On the engineering staff, **Frank S. Preston** was named chief engineer, **Edward R. Harris** assistant chief engineer, **Leo Botwin** chief-engineering operations, **Malcolm V. Lane** administrative engineer, and **Robert D. Rinehart** chief-component engineering.

Robert L. Davidson was elected president of **Kurz-Kasch Inc.**, Dayton, Ohio, to succeed **W. G. Davidson**, who continues as treasurer.

Walter H. Girdler Jr. was named chairman and chief executive officer of **Matthews Corp.**, Hawthorne, Calif. He was formerly with Chemetron Corp., Chicago, and Girdler-Tube Turns of Louisville.

Donald A. Hendricks was elected president, **Phoenix Engineering & Mfg. Co.**, Phoenix, Ariz., subsidiary of Telecomputing Corp. He was Phemco's vice president and general manager, and continues in the latter post.

Wyman-Gordon Co., Worcester, Mass., named three vice presidents. They are: **James L. Roach**, director of marketing; **Joseph R. Carter**, general manager, Eastern Div. (Worcester and North Grafton plants); and **Robert E. Zell**, general manager, Ingalls - Shepard Div., Harvey, Ill.

George Wulff was named a regional sales manager for **Rockwell Mfg. Co.**'s Walker-Turner Div., covering California, Nevada, and Arizona.

Norman Fischell was appointed vice president-production, **Circo Equipment Co.**, Clark, N. J. He previously served as chief engineer, Container Div., Jones & Laughlin Steel Corp.; plant engineer, Container Div., Inland Steel Corp.; and development engineer in the Engineering & Research Div., Celanese Corp.

W. Glenn Williams was made manager of product sales, Rectifier Sec-

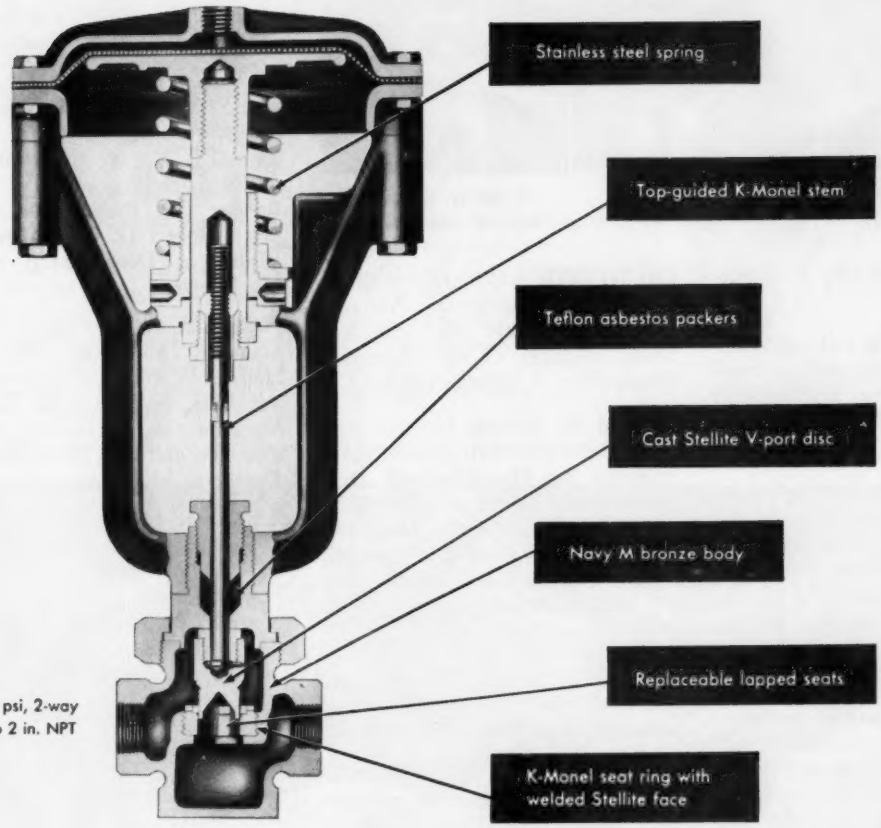
CLAUDE J. NEVILLE
Bartlett & Snow pres.

WALTER H. GIRDLER JR.
Matthews chairman-chf. exec.

DONALD A. HENDRICKS
Phoenix Eng. president

NORMAN FISCHELL
Circo v. p.-production

SINCLAIR-COLLINS® V-PORT VALVES



. . . for precise control of pressure or temperature . . . steam, hot or cold raw water service

Sinclair-Collins' V-port valves offer a solution to your temperature or pressure modulation problems. Designed for instrument actuation, they offer variable metering to provide extremely accurate and consistent control of media flow rates. Highest quality materials and Sinclair-Collins' precision manufacturing methods assure long, reliable service life, with minimum maintenance downtime. Stainless steel trim resists corrosion . . . Stellited seat ring and port disc resists wire drawing and cutting. Find out how S-C V-port valves can meet your control needs . . . a call to your near-by Sinclair-Collins Field engineer will bring prompt application engineering recommendations.

For more information write for free Bulletin SC-59. Address: Sinclair-Collins Valve Company, Akron 9, Ohio, Dept. ST-360

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AKRON, OHIO

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

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8117

JAMES E. McDONALD
National Tube prod. mgr.

RUSSELL M. NEIN
Armco mill supt.

LEO W. OLLILA
National Forge mfg.-dir.

tion, **Allis-Chalmers Mfg. Co.**, Milwaukee.

James E. McDonald was appointed manager, mechanical and pressure tubing products for U. S. Steel Corp.'s **National Tube Div.**, Pittsburgh.

Russell M. Nein was made superintendent of the cold strip mill at **Armco Steel Corp.'s** Middletown, Ohio, Works. He succeeds **Perry A. Hoss**, retired.

Paul Houser, personnel and office manager, **Union Chain & Mfg. Co.**, Sandusky, Ohio, assumes additional duties of purchasing agent to succeed **T. J. Sartor**, recently named treasurer-controller. **Alex Skinner-Klee** was made manager-Eastern region, with offices in New York.

Russell L. Jolley, president of **Southwest Steel Products**, Houston, since he organized the firm in 1946, resigned to become a consultant for Armco Steel Corp., Middletown, Ohio. Armco acquired Southwest Steel Products in 1954 as a subsidiary. **L. T. DeLaup**, executive vice president, assumes responsibility for sales, advertising, public relations, and engineering for Southwest. Production at both the Houston and New Orleans plants continues in charge of **D. W. Hallam**.

J. Calvin Brantley was made director of research for **Union Carbide Nuclear Co.**, a division of Union Carbide Corp. He is at the research center, Tuxedo, N. Y.

Nile E. Sweet was made western sales manager, Chicago office, **Mead-Morrison Div.**, McKiernan-Terry Corp.

Leo W. Ollila was appointed director of manufacturing, **National Forge Co.**, Irvine, Pa. He was works manager of the Worcester, Mass., plant of Wyman-Gordon Co.

Richard W. Helmig fills the new post of vice president-product management for **Harris-Seybold Div.**, Harris-Intertype Corp., Cleveland. **Charles J. Conlin Jr.** succeeds Mr. Helmig as Cleveland division manager. **Norton McGiffin** replaces Mr. Conlin as controller.

Harold H. Dice was elected vice president of **General Motors Corp.**, Detroit. He was made general manager of the Allison Div., Indianapolis, Mar. 1.

John B. Kendall was made manager of **Chrysler Corp.'s** Conant stamping plant, Detroit. He succeeds **W. R. Gerber**, who joins the staff of the general plants manager for the Stamping Div.

Charles W. Marchmann was appointed Eastern regional sales manager for **Little Giant Products Inc.**, Peoria, Ill. He has offices in Cincinnati.

Francis H. Hohn, chief metallurgist of **Scullin Steel Co.**, St. Louis, division of Universal Marion Corp., was appointed assistant to the works manager.

David B. Nichinson was elected president of **Kollsman Instrument Corp.**, New York, effective Apr. 1. Former vice president-engineering, he succeeds **Victor E. Carbonara**, retired.

Jon H. Myer was made manager of the new materials development and supply laboratory of **Hughes Aircraft Co.'s** Semiconductor Div., Newport Beach, Calif.

Karl Kelly was named manager of the Pittsburgh district sales office of **I-T-E Circuit Breaker Co.**, succeeding **B. W. Blose**, on leave of absence. Mr. Kelly continues to handle Buffalo area operations temporarily.

Nye S. Spencer, former sales manager-switchboard section, Switchgear Div., was made manager, utility marketing, of **I-T-E Circuit Breaker Co.**, Philadelphia. He replaces **Robert D. Cleaves**, resigned. **William A. Donaldson Jr.** replaces Mr. Spencer.

Herman Schroll was appointed sales manager, Die Supply Div., Cleveland, **E. W. Bliss Co.** Prior to joining Bliss, he was with Campbell Machine Co. in Detroit as sales manager, and with Masco Mfg. Co., Dearborn, Mich., as assistant chief engineer.

Acme Steel Co., Chicago, named **C. G. Heslet** manager of applications engineering, **J. W. Mecklenburger** manager of development engineering, **R. E. Swingle** manager of the shippers' laboratory.

D. B. Scott succeeds **F. C. Ludington** as manager of **Allis-Chalmers Mfg. Co.'s** Control Dept., Milwaukee. Mr. Ludington will serve as a consultant until his retirement in July.

W. J. Wiley was made manager-missile manufacturing at **Aerojet-General Corp.'s** Downey, Calif., plant.

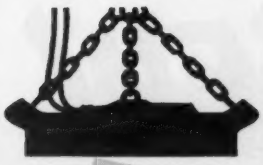
OBITUARIES...

Lowell H. Rood, president of **General Industrial Equipment Co.**, representative of Niagara Blower Co. in Pacific Coast states, died Mar. 2.

Howard C. Waldron, 55, assistant works manager, **Nordberg Mfg. Co.**, Milwaukee, died recently.

Ivan F. Schoonmaker, 66, president, **A. H. Wells Div.**, Waterbury, Conn., Miller Co., died Mar 8.

Chesley Paul, 67, purchasing agent and vice president, **Mathews Conveyer Co.**, Ellwood City, Pa., died Mar. 6.



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heavier construction

OHIO BOLTED MAGNETS. 12 to 65" dia. 6-coil types in 39 to 65"; 8-coil in 55 & 65". Strap coils over 39". Bolts protected in recessed wells. Also capsule-coil over 45".

OHIO WELDED MAGNETS. 39 to 65" dia. Lightweight models in 39 & 45". 6-coil in 46, 55, 65"; 8-coil in 55 & 65". Weld on top where it can't get dented in. Also capsule-coil over 45".

OHIO BASKET MAGNETS. 55 & 65" 4-coil, & 65" 6-coil. For extra heavy-duty service. No weight carried by bolts. Also capsule-coil over 45".

In slag reclamation or rough service—or any use where magnets are subjected to hard knocks—you need the extra heavy construction and greater lifting power of Ohio Magnets.

This super-strong Ohio Basket Magnet has an outer ring with integrally cast fenders that project beyond magnet diameter to ward off and protect against damaging blows. Extra heavy top plate is held in place with strong nickel-steel bolts.

For extra magnet life, extra magnet value—specify Ohio Magnets. Remember, Ohio Magnets lift larger loads longer—*especially with Ohio Magnet Controllers.*

Send for Bulletin No. 112. Offices in principal cities listed in Classified Directory.

Ohio gives prompt service in reconditioning and rebuilding magnets

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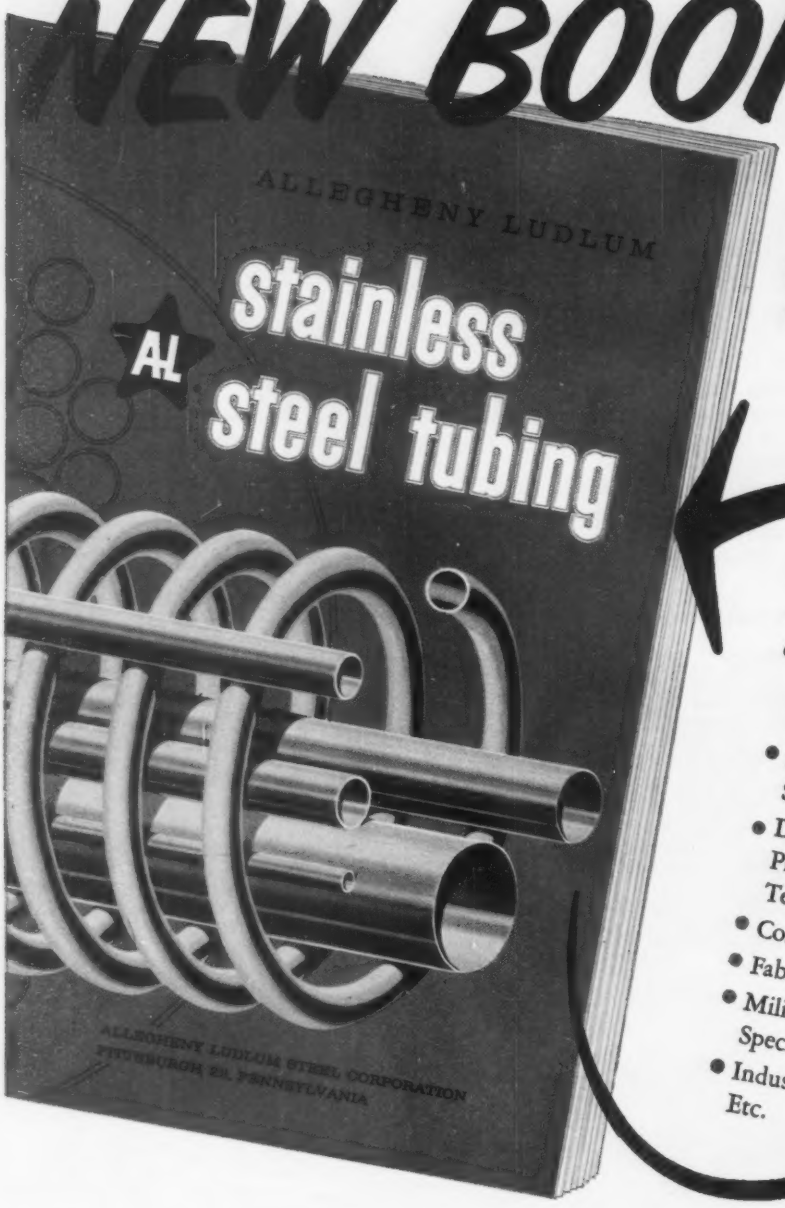
CHESTER BLAND
President

NEW BOOKLET

on STAINLESS STEEL TUBING

sent on request



PARTIAL LIST OF CONTENTS

- Stainless Steel grades
- Product data on Seamless Tubing and Welded Tubing
- Size range Stainless Pipe & Tubing
- Design data—Internal Pressures—Elevated Temperatures, etc.
- Corrosion resistance
- Fabrication data
- Military & Aircraft Specifications
- Industry's uses

Etc.

This 36-page booklet newly published by Allegheny Ludlum is packed with technical data and authoritative information on both welded and seamless stainless steel tubing. There are more than 20 tables for ready reference and many photographs.

It will be helpful to design engineers and others interested in solving the many critical and demanding pipe and tubing applications.

The booklet contains the best and latest information available on product and design data on the subject—the partial contents listed give some idea of its scope. You'll want a copy for your files.

Write for your free copy of Allegheny Stainless Steel Tubing, *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania. Address Dept. S-272.*

1287

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EVERY FORM OF STAINLESS . . . EVERY HELP IN USING IT

Chase to Spend $2 Million For Tube Mill Equipment

CHASE BRASS & COPPER CO., Waterbury, Conn., will institute new tube mill processing at its Chase Metal Works. Cost: More than $2 million.

The unique design of the automatic tube rolling operation provides the flexibility required for producing varying sizes and many alloys. The equipment is designed for rapid, precise sequencing of a series of related production operations. The precision of the mechanization insures continuous high quality, savings in time and operation costs, and increased production, say officials of this subsidiary of Kennecott Corp., New York.

Glenn P. Bakken, president of Chase, says the company will be able to compete more effectively in supplying customers with copper alloy tube as a result of the new operations. He says the progressive methods of other producers and the increase in imports require that Chase follow a carefully planned, forceful, and sustained program to assure that the company will continue to hold its high position in production quality and productivity.

New tube rolling operations are scheduled to start before the close of the year. A large volume of intricate electrical work related to the equipment is involved in early stages of the project.

Acquires Instrument Line

Robertshaw-Fulton Controls Co., Richmond, Va., bought the Acragage instrument business of International Register Co., Chicago. Robertshaw will make the gages in its Knoxville, Tenn., plant.

Glascote Plans Expansion

Glascote Products Inc., Cleveland, is initiating an expansion program designed to double production facilities and set the stage for substantial product growth. New facilities will include a rail spur, heavy duty cranes, and larger, improved furnaces. The firm, a subsidiary of A. O. Smith Corp., Milwaukee, makes heavy duty, glass lined reactors; vessels; columns; storage tanks; rotary dryer-blenders; and other products.

Ups Semiconductor Output

Westinghouse Electric Corp., Pittsburgh, plans to erect a building that will expand the firm's Semiconductor Dept. at Youngwood, Pa., by 30 per cent. The plant will be devoted primarily to the development and processing of semiconductor materials, including new forms of silicon and germanium. Certain areas of an enlarged laboratory will be used for pilot production. Other areas will be designed for sensitive chemical operations. Some activities of the department's manufacturing engineering laboratory will be moved to the new plant.

Kenworth to Spin Metals

Kenworth Products Inc., a wholly owned subsidiary of Kenworth Mfg. Co., Milwaukee, has entered the metal spinning field through purchase of a plant at Elkhorn, Wis., from American Metal Spinning Co., Milwaukee. The plant includes three buildings with a total floor space of about 5000 sq ft. Kenworth Products makes steel piers, aluminum ladders, work handling equipment, department store racks, and razor blade knives.

A-C Forms New Division

Allis-Chalmers Mfg. Co., Milwaukee, has combined its Industrial Div. and General Products Div. into an operating unit called the Industrial Equipment Div. with W. M. Wallace as vice president and general manager and G. A. Saar as assistant general manager. The new division includes the compressor, processing machinery, centrifugal pump, control, and the industrial systems departments, plus the Norwood Works (motor and pump manufacturing facility). Canadian Allis-Chalmers, formerly part of the Industrial Equipment Div., will operate as a separate division of the Industries Group. H. M. Schudt is divisional general manager.

Foundry Changes Hands

Outstanding shares of Foothills Steel Foundry & Iron Works Ltd., Calgary, Alta., have been purchased by H. A. Irving and D. F. Irving, owners of Irving Wire Products Ltd., that city. Bulk of castings are shipped to points in western Canada, but volume is steadily increasing to markets in eastern Canada and the Pacific Northwest in the U. S.

In-Sink-Erator to Expand

In-Sink-Erator Mfg. Co., Racine, Wis., producer of a garbage disposal unit, plans a $1 million expansion within a year or two. The program involves construction of a 125,000 sq ft plant and office, replacement of equipment, and purchase of new units.

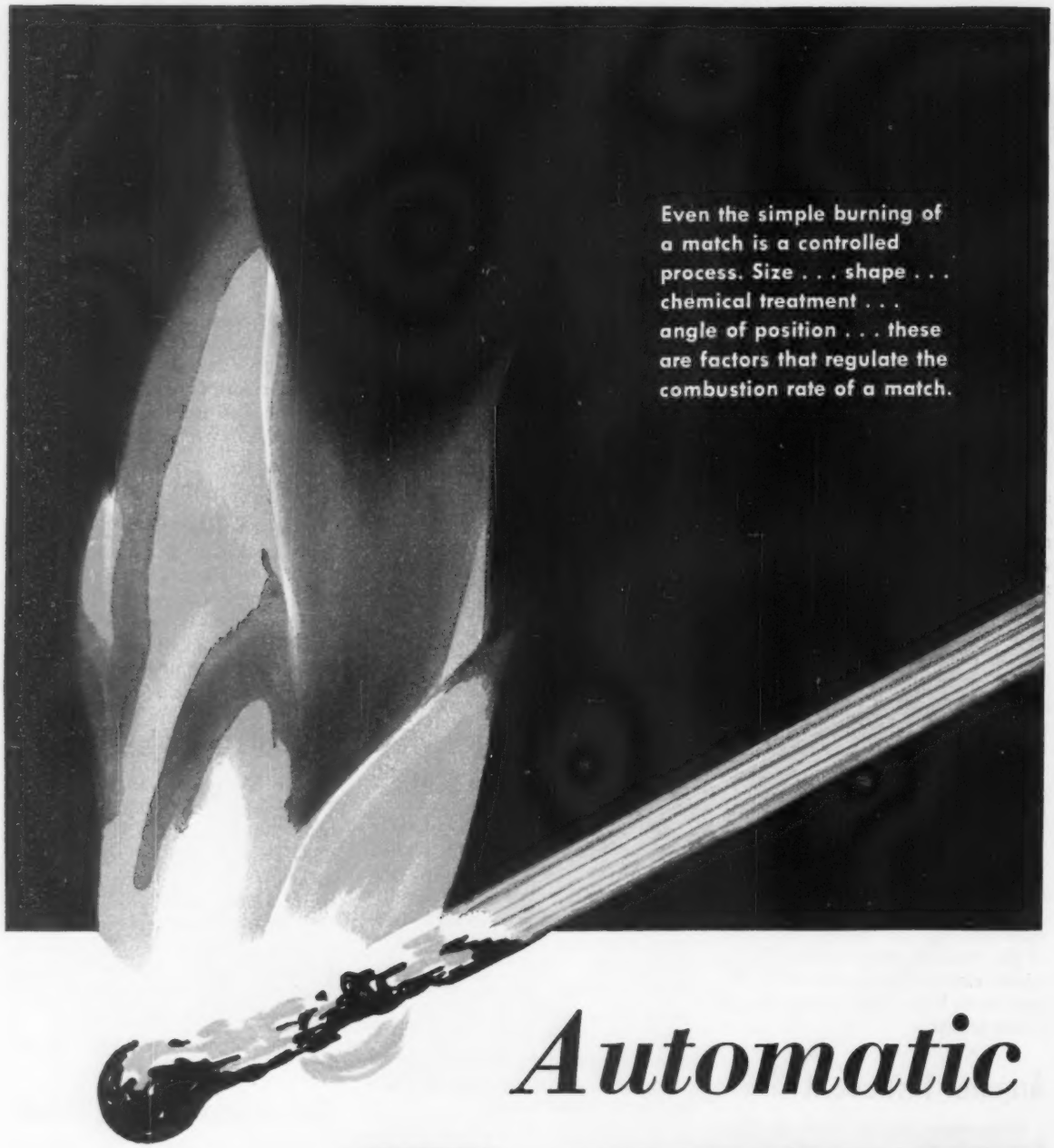
Inland Buys Ajax Units

Ajax Magnethermic Corp., Youngstown, has received an order from Inland Steel Co., Chicago, for two core type melting furnaces (200 and 400 kw). The units will be used to melt and hold at temperature the zinc alloy for a fourth continuous galvanizing line at Inland's Indiana Harbor (Ind.) Works. With the installation of the new line, galvanized steel capacity at the plant will be increased 35 per cent.

Germanium Output Hiked

A $500,000 expansion for the production and processing of single crystal germanium and silicon for use by the semiconductor industry is announced by the Chemical & Metallurgical Div., Sylvania Electric Products Inc., New York, a subsidiary of General Telephone & Electronics Corp. New equipment will include units for producing germanium single crystals by vertical and horizontal methods and silicon crystals by vertical and float zoning techniques. Auxiliary equipment will include slicing and lap-

(*Please turn to Page* 126)


Even the simple burning of a match is a controlled process. Size . . . shape . . . chemical treatment . . . angle of position . . . these are factors that regulate the combustion rate of a match.

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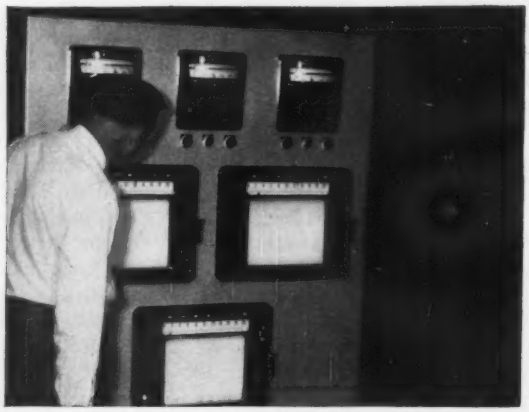

Process Control...

Just as the controls for a match are tailored to meet specific requirements, Wheelco systems are tailored to meet your requirements for automatic process control, combustion safeguards and gas chromatography. Experienced engineering, modern production facilities and instrument reliability backed by a world-wide service network are your reasons for specifying Wheelco systems. Tell us about your process control problems. Contact your nearby Wheelco sales office.

At Left: The Wheelco control center in a large Midwestern heat-treating plant uses Limitrols and 8000 Series Recorders for operating a continuous three-zone electric furnace with capacity of 1000 lbs. per hour.

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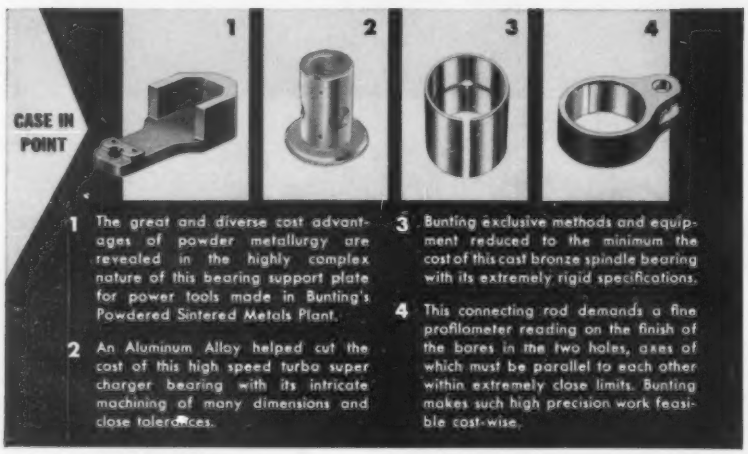

1 The great and diverse cost advantages of powder metallurgy are revealed in the highly complex nature of this bearing support plate for power tools made in Bunting's Powdered Sintered Metals Plant.

2 An Aluminum Alloy helped cut the cost of this high speed turbo super charger bearing with its intricate machining of many dimensions and close tolerances.

3 Bunting exclusive methods and equipment reduced to the minimum the cost of this cast bronze spindle bearing with its extremely rigid specifications.

4 This connecting rod demands a fine profilometer reading on the finish of the bores in the two holes, axes of which must be parallel to each other within extremely close limits. Bunting makes such high precision work feasible cost-wise.

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(*Concluded from Page* 123)

ping machines and electrical testing facilities for crystal evaluation.

Youngstown Firm Expands

Bessemer Limestone & Cement Co., Youngstown, plans a six year improvement program costing $10 million to $12 million. The project includes construction of a cement plant with larger and more efficient equipment to replace a 40 year old plant and alterations and additions to the crushing, screening, and stone conveying facilities.

Fluid Power Ltd. Formed

Fluid Power Ltd., a newly formed company at 15-21 Alpine Ave., Toronto, Ont., has purchased the manufacturing facilities and has acquired the rights to manufacture the engineering products of Viceroy Mfg. Co. Ltd. They include pneumatic and hydraulic cylinders and equipment, hydraulic machinery, molding equipment, latex and rubber forming machinery, special purpose machinery, instruments, and aircraft components. H. J. A. Chambers is president.

Ampco Buys Foundry

Ampco Metal Inc., Milwaukee, purchased an A. O. Smith Corp. foundry at Huntington Park, Calif., formerly used by the Smith firm to supply its West Coast Smith-Erie Div. Operations of the division have been moved to Erie, Pa. The foundry has about 23,000 sq ft of space, almost 50 per cent more than Ampco's present branch plant at Burbank, Calif. Ampco plans to build an office building on the Huntington Park site.

B-W Forms Controls Div.

Borg-Warner Corp., Chicago, established a Controls Div. at Santa Ana, Calif. The new operation will take over the personnel, products, and facilities of the firm's BJ electronics plant. Fred T. Miller has been named vice president and general manager of the Controls Div.; Ira E. Weston, chairman; and Fred O. Hosterman, president and chief executive officer. Mr. Weston will continue as chairman and chief executive officer of Weston Hydrau-

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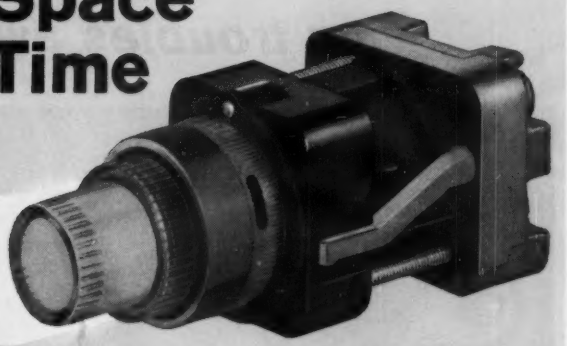
Save Mounting Space and Installation Time *with this...*



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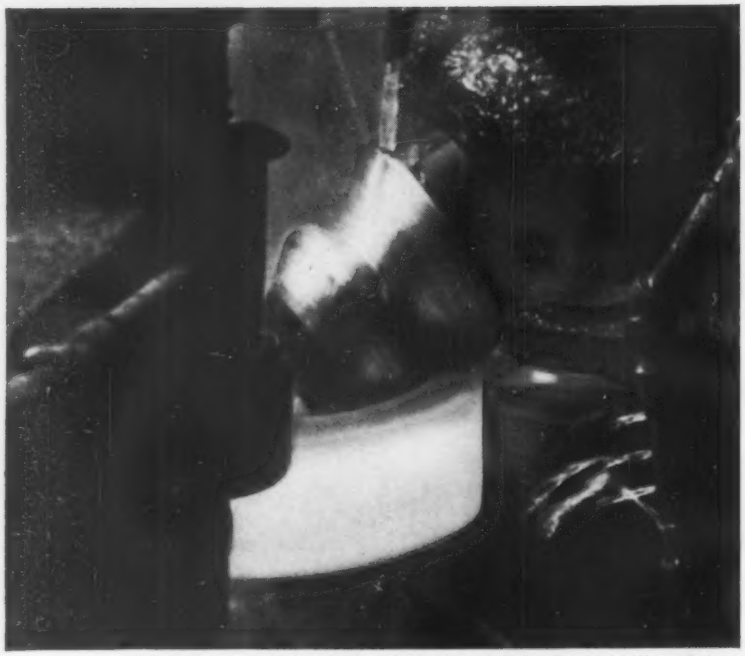


Closeup of ring rolling, showing edging roll and portion of ring.

Edgewater ROLLED STEEL Rings

Your choice of diameter and cross-section —Complete, modern rolling, heat-treating and machining facilities enable us to produce steel rings *with precise accuracy* . . . in a large range of sizes and wide variety of cross-section shapes. Sizes are from 5 in. to 145 in. in diameter; shapes may be simple or complex. Edgewater rolling process minimizes finishing operations . . . provides rings of maximum strength, toughness and uniformity.

Meeting your specifications — Send us your drawings. We can furnish rings to closest tolerances or recommend revisions that will give you the best combination of performance and economy.

Edgewater Steel Company

P. O. Box 478, Dept. S Pittsburgh 30, Pa.

lics Ltd., a Borg-Warner subsidiary; Mr. Hosterman will continue as president and general manager of Weston.

Technical Branch Formed

Electro Minerals Div., Carborundum Co., Niagara Falls, N. Y., is constructing a $750,000 building to house the laboratories and offices of its newly established Technical Branch. Manager will be Bruce Walker, assisted by F. Paul Ronca, manager of quality control, and Dr. D. W. Gillmore, manager of development.

Line Materials Expands

Line Materials Industries, a subsidiary of McGraw-Edison Co., South Milwaukee, Wis., has launched an $800,000 expansion of its plant in Birmingham. When completed, distribution transformers will be added to the list of products made at that plant. R. M. Donahue is plant manager.

NEW ADDRESSES

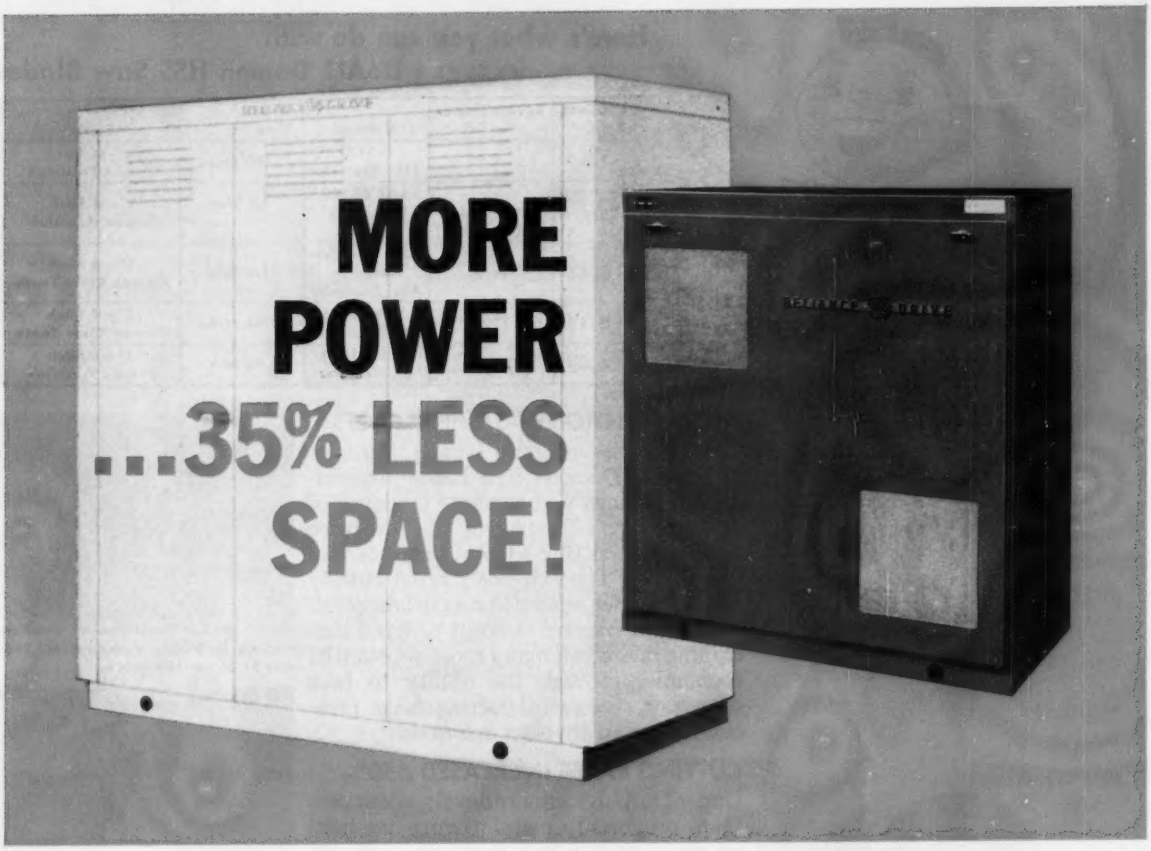
Jones & Laughlin Steel Corp. opened its new steel service center at 16500 Rockside Rd., Maple Heights (Cleveland), Ohio.

American Metal Climax Inc. consolidated its New York corporate and division offices at 1270 Avenue of the Americas, New York 20, N. Y. Offices of operating divisions affected include those of Amco Div., Mining & Exploration Div., Climax Molybdenum Co., Southwest Potash Corp., and American Climax Petroleum Corp.

Coated Abrasives Inc. transferred its manufacturing operations from Milwaukee to Warren, Mich., and its general staff offices to 11920 E. Eight Mile Rd., Detroit 5, Mich.

Mobay Chemical Co. moved its administrative, sales, and engineering headquarters to Penn-Lincoln Parkway West, Robinson Township, Pa. The new general office building is about 8 miles from downtown Pittsburgh. Mobay is an associate company of Monsanto Chemical Co., St. Louis, and Farbenfabriken

Reliance Super 'T' V★S Drives



Both of these control units are rated at 50 horsepower! Actually, the new, small Super 'T' V★S cabinet packs more punch!

LIKE the Reliance Super 'T' Drive Motor, new V★S power units utilize Class B insulation, permitting a more compact unit. 100% overloads of one minute duration are accomplished without failure! Advanced design of ventilation keeps control and power units cooler . . . another reason why smaller size is possible. And service life is substantially extended.

Matched system design of drive motor, power unit and controls produces a highly efficient, integrated drive—to give you a wide range of stepless, variable operating speeds from a-c. circuits.

Super 'T' V★S Drives are available for immediate delivery. Check your Reliance salesman for delivery schedules on the full line, 1—350 hp., Bulletin Number D-2506, has been prepared to give you complete information. Write for it. D-1641

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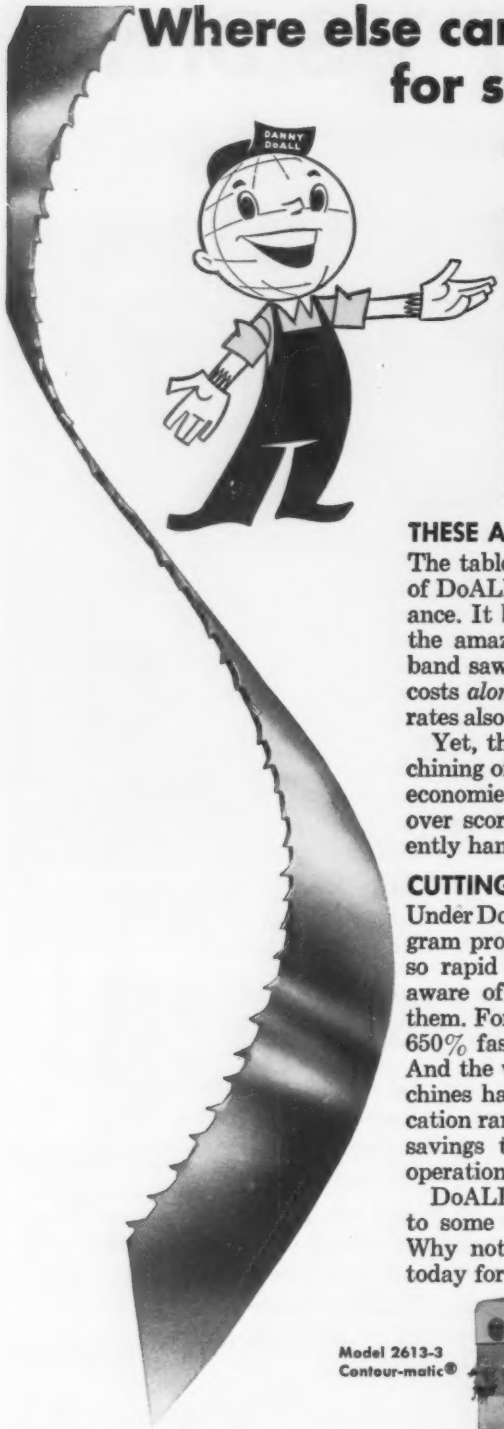
Where else can you buy so much cutting for so little tool cost?



Here's what you can do with DoALL Demon HSS Saw Blades

Tool Cost Per Cut	Square Inches Per Cut	Material	Time Per Cut	Blade
1.4¢	8.95	C-1137 3⅜" Diameter	50 Sec.	¾"—6 Pitch Demon Precision
¾¢	2.25	SAE 52100 1½" x 1½" Square	1.5 Min.	1"—8 Pitch Demon Precision
6.4¢	16.8	#321 Stainless Steel 4⅝" Diameter	7.3 Min.	1"—4 Pitch Demon Claw Tooth
5.1¢	19.63	SAE #1045 5" Diameter	1.96 Min.	1"—4 Pitch Demon Claw Tooth
4.6¢	28.27	AISI #1018 6" Diameter	2.46 Min.	1"—6 Pitch Demon Precision

THESE ARE MONEY-SAVING FACTS

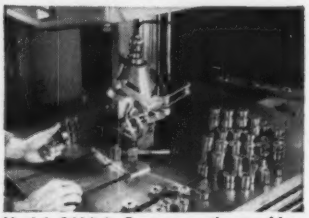
The table above shows typical examples of DoALL Demon® Saw Blade performance. It brings you concrete evidence of the amazing efficiency of the low-price band saw's cutting edge in terms of tool costs *alone*. The extremely rapid cutting rates also offer a *direct* saving in labor cost.

Yet, the modern concept of band machining offers you many more substantial economies through the ability to take over scores of metal-cutting tasks presently handled by older methods.

CUTTING RATES INCREASED 650%

Under DoALL's intense development program progress in metal sawing has been so rapid that many users are not yet aware of the new savings available to them. For example, cutting rates average 650% faster than only a few years ago. And the versatility of the new band machines has greatly extended their application range. This is bringing substantial savings to hundreds of manufacturing operations.

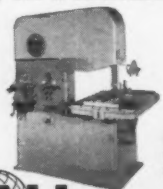
DoALL specialists can open your eyes to some new money-saving techniques. Why not call your local DoALL store today for a demonstration.



Model 2613-3 Contour-matic machine slotting hydraulic pump rotors. Tool cost $1.06 per 100 rotors.

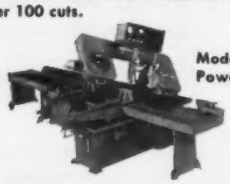
Model 1612-3 Contour-matic parting silicon steel transformer cores. Tool cost $3.19 per 100 cuts.

Power Saw Model C-68 cutting 3¼" diameter AISI 1015. Tool cost $1.54 per 100 cuts.



Model 2613-3 Contour-matic®

Model C-12 Power Saw



Model C-68 Power Saw

SB-64A

Find Your DoALL Store In The 'Yellow Pages'

A typical DoALL store

The DoALL Company, Des Plaines, Illinois

Call Your DoALL Service-Store

Machines and Blades · Surface Grinders · Power Saws · MACHINE TOOLS · CUTTING TOOLS · MEASURING INSTRUMENTS · SHOP SUPPLIES IN STOCK

Bayer AG of West Germany.

NEW OFFICES

Jones & Laughlin Steel Corp., Pittsburgh, opened sales offices for its Stainless & Strip Div. at 235 Montgomery St., San Francisco 4, Calif., and at 111 S. Bemiston Ave., Clayton 5 (St. Louis), Mo. H. A. Whitbeck Jr. is resident manager of sales at San Francisco. Paul G. Renn is resident salesman at Clayton.

NEW PLANTS

Armco Drainage & Metal Products Inc., subsidiary of Armco Steel Corp., Middletown, Ohio, will build a 41,000 sq ft plant at Hillsboro, Oreg. The $500,000 facility will produce corrugated metal and sewer pipe. When completed late this year, it will replace the present Armco Drainage plant at Portland, Oreg. D. J. Stoker is vice president and general manager of the North Pacific Div.

Mosler Lock Co., a subsidiary of Mosler Safe Co., New York, formally opened its plant at Milford, Ohio. The 42,000 sq ft of space is devoted to production of precision lock products.

John Inglis Co. Ltd. is constructing a $2 million plant at Scarboro, Ont. The 100,000 sq ft plant will turn out such products as transformers and motors. The company will discontinue operation at St. Catharines, Ont., on completion of the new plant early next year.

Seiberling Rubber Co., Akron, will build a $1.3 million plant at Batesville, Ark., if that city's bond issue is approved. The 100,000 sq ft facility will produce shoe products and other rubber goods now produced at full capacity in Seiberling's Barberton and Carey, Ohio, plants.

Air Reduction Pacific Co., a division of Air Reduction Co. Inc., New York, dedicated in Richmond, Calif., a new liquid air separation

(*Please turn to Page* 134)

Most Important Event in METALWORKING

1960 ASTE TOOL SHOW and CONFERENCE

530 exhibitors will be on hand to show and demonstrate more than 6,000 products . . . machine tools and attachments, precision control and inspection equipment, automation devices, cutting tools, dies, jigs and fixtures . . . everything, in fact, that's *new* in tools and tooling. It's your best opportunity to see, study, compare . . . under one roof, at one time . . . the most modern, scientific methods, processes and tools in metalworking.

Equally important, the Tool Engineering Conference, with its 36 technical sessions, 70 outstanding papers, offers you an opportunity to learn about and discuss the latest technical advances and developments in the science of tool engineering.

There'll be plant tours, too . . . a chance to see and study, in actual operation, product and process methods in the world's major center of high-volume production.

All of these scientific and educational attractions, and more, will bring more than 35,000 metalworking management, engineering and production men to the 1960 ASTE TOOL SHOW. Make sure you're one of them! Write or wire immediately for your rapid registration forms.

APRIL 21ST-28TH

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AMERICAN SOCIETY OF TOOL ENGINEERS

10700 PURITAN AVENUE
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THE AMERICAN SOCIETY

'60

OF TOOL ENGINEERS

NEW FROM FAIR STREET • HOME OF THE JIGMIL

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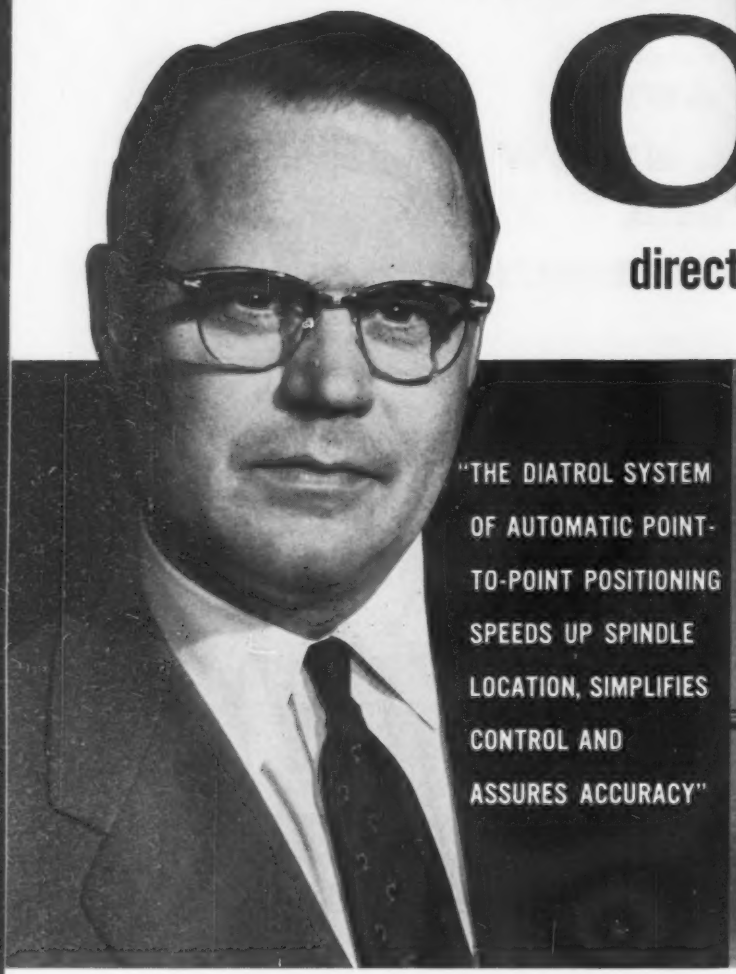
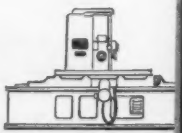
direct dial dimensioning system



"THE DIATROL SYSTEM OF AUTOMATIC POINT-TO-POINT POSITIONING SPEEDS UP SPINDLE LOCATION, SIMPLIFIES CONTROL AND ASSURES ACCURACY"

"Simply dial in the pre-selected coordinate dimensions, touch a button, the rest is automatic. The JIGMIL table and spindle head automatically position at the desired hole location in seconds. While the JIGMIL is machining, you can *pre-set* your next move. Developed by our own engineers, Diatrol adds to the inherent versatility and accuracy of the JIGMIL, further reducing human error as well as set-up and machine time. *Diatrol makes it possible to machine custom or small lot jobs at production rates.*"

C. R. DE VLIEG



DEVLIEG MACHINE COMPANY, FAIR STREET • ROYAL OAK, MICHIGAN

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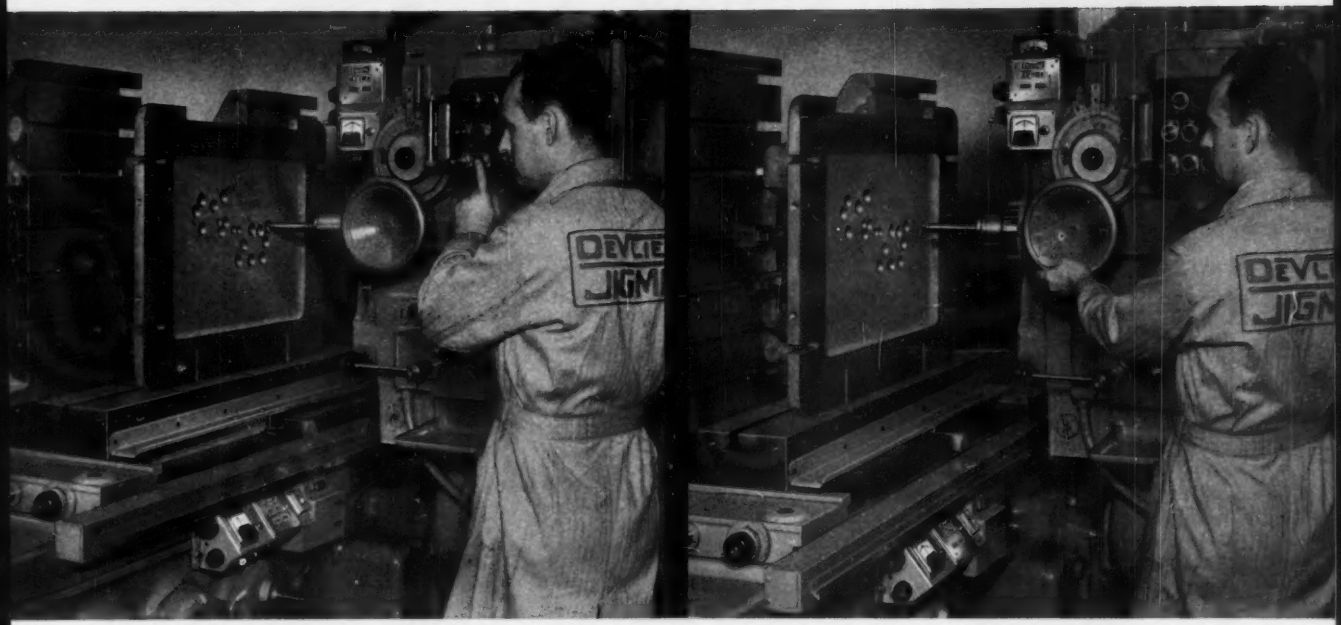
for DeVlieg Spiramatic Jigmils



Simple! Accurate! Automatic! Diatrol is a transistorized electro-mechanical system, simple in design and simple to operate. All settings are made on direct reading dials; one dial for horizontal, the other for vertical dimensioning. Direct dialing of positive or negative dimensions is possible from any arbitrarily selected datum plane or zero point within the range of the system. Coordinate dimensions can be fed direct from the blue print, eliminating much of the mathematics formerly required for accurate jig boring. Measurement and positioning accuracies are controlled to one-ten-thousandth of an inch. Developed exclusively for the JIGMIL, Diatrol is now available for the complete range of JIGMIL precision boring and milling machines. For complete information, write or arrange a visit to Fair Street.

Rewarding revelations in precision await your visit to Fair Street

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DeVlieg

SPIRAMATIC JIGMILS®

ACCURATE HOLES AND FLAT SURFACES IN PRECISE LOCATIONS

NEW Snap-on

MAGNETIC SOCKETS last ten times longer — give re-usable magnet bonus

Cutaway view showing socket, magnet, self-tapping screw. *Snap-on* magnetic sockets are available in the following sizes: ¼-in. drive for ¼, 5/16, 3/8, 7/16-in. sockets; 3/8-in. drive for 5/16, 3/8, 7/16, ½, 9/16-in. sockets; ½-in. drive for 7/16, ½, 9/16-in. sockets.

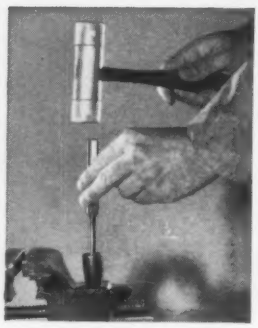
On actual customer test, this newly developed socket drove 112,320 self-tapping screws. A similar competitive socket, priced only about 30 cents less, wore out after driving only 10,530 screws. Both sockets were subjected to identical conditions.

Figure what *you* can save by switching to these new *Snap-on* sockets — in replacement cost — and in assembly line downtime, too.

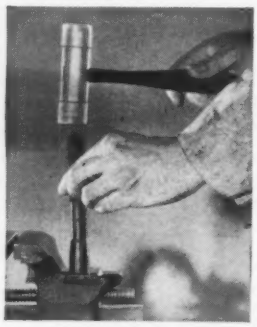
and here's an Extra Bonus . . . re-use your magnets — save up to 50%

In addition to far greater life, this socket is available without the magnet. You simply tap or press the magnet out of the worn-out socket — insert it in the new one. You save 50 percent on the cost of a complete magnet socket. *Snap-on* has developed an inexpensive tool that inserts the magnet to exactly the right depth.

This is an example of *Snap-on* research and development that helps industry save time and money. Your *Snap-on* industrial tool specialist can show you many more. Branch offices and warehouses are conveniently located in 58 major cities throughout the U.S. and Canada.



To remove magnet, simply tap it out of the socket with an appropriate punch.



To re-insert, just tap magnet into socket with *Snap-on* assembly punch. The entire operation takes about a minute.

SNAP-ON TOOLS

FOR ALL INDUSTRY

8121-C 28th Avenue • Kenosha, Wisconsin

(*Concluded from Page* 131)

plant. The $3 million installation will produce daily 30 tons of liquid oxygen, nitrogen, and argon.

ASSOCIATIONS

David A. Cowhig, Wilkening Mfg. Co., Philadelphia, has been elected president of the **Metal Manufacturers Association,** that city.

Robert E. Macherey has been appointed associate director of the Metallurgy Div., **Argonne National Laboratory,** Lemont, Ill.

CONSOLIDATIONS

Howe Sound Co., New York, has acquired **Peterson Machine Tool Inc.,** Merriam (Kansas City), Kans., producer of magnetic particle inspection equipment, vertical surface grinders, and valve seats.

International Harvester Co., Chicago, has acquired **Solar Aircraft Co.,** San Diego, Calif., and plans to operate it as a subsidiary. Herbert Kunzel will continue as president of Solar.

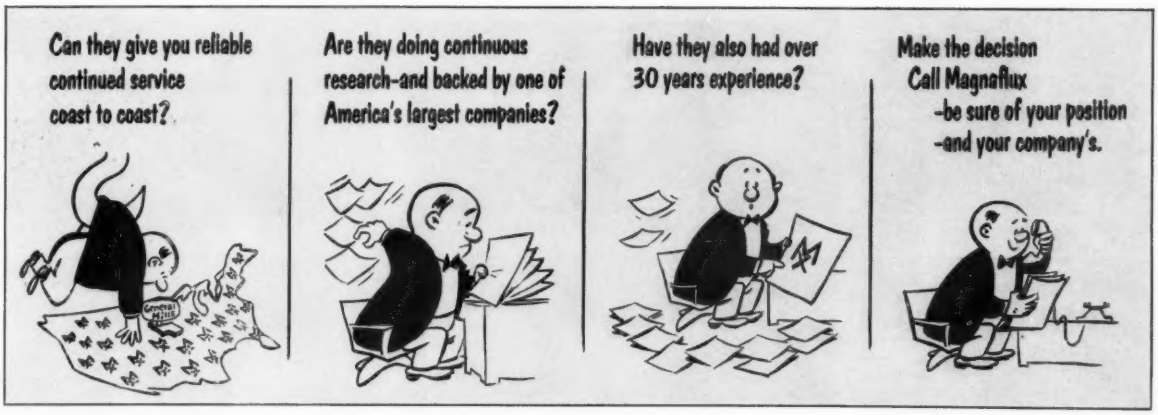
American Chain & Cable Co. Inc., New York, purchased **Electro-Mech Corp.,** Norwood, N. J., manufacturer of control systems and associated control apparatus. Electro-Mech will operate as a subsidiary with P. A. Sutton continuing as president and general manager.

Electronic Communications Inc., St. Petersburg, Fla., and **W. L. Maxson Corp.,** New York, will merge if stockholders approve. The Florida firm produces electronic systems and subsystems, electronic countermeasures, and allied defense equipment. Maxson produces electronic systems and components for armament, navigation, and special devices.

Baird-Atomic Inc., Cambridge, Mass., acquired **Axler Associates Inc.,** Corona, N. Y., manufacturer of optical interference filters and infrared and ultraviolet instruments for chemical analysis. Axler operations will be moved to Cambridge.

Are YOU the one who selects testing equipment?

Will your decision bring praise from your boss?
Will your decision bring admiration from your associates?
For he's a jolly good fellow!
How will it make your competition look?
CLOUD 9
competition
Are you familiar with testing equipment companies?


Can they give you reliable continued service coast to coast?
General Mills
Are they doing continuous research-and backed by one of America's largest companies?
Have they also had over 30 years experience?
Make the decision
Call Magnaflux
-be sure of your position
-and your company's.

Magnaflux Test Systems

MAGNAFLUX-MAGNAGLO to test magnetic materials for cracks, seams, etc.
ZYGLO for nonmagnetic and other materials; cracks, leaks, etc.
SONIZON Ultrasonic Thickness Measuring
STRESSCOAT to find and measure stress on parts, overall!
MAGNATEST electronic testing for hardness, conductivity, alloy, proximity, and many more. Also for precision magnetic field measurement. And still other methods and techniques, some completely new.

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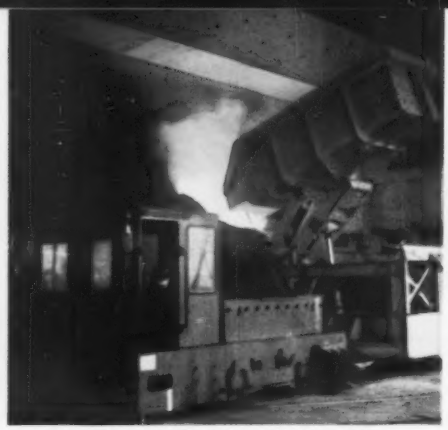
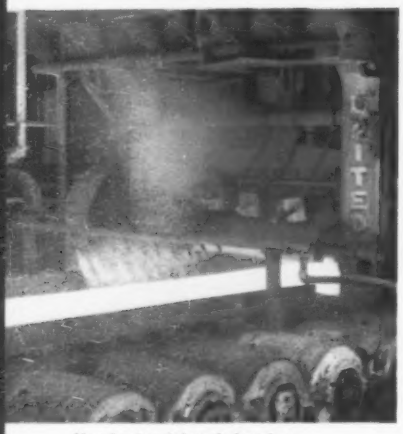
The Hallmark of *Quality* in nondestructive test systems

New 400,000-ton capacity blast furnace

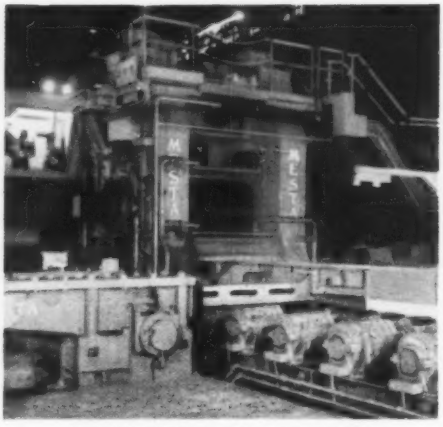


New $11 million basic oxygen furnace facility

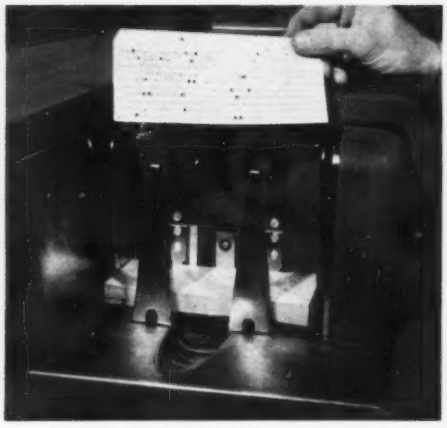
New $74 million, 11-furnace open hearth shop



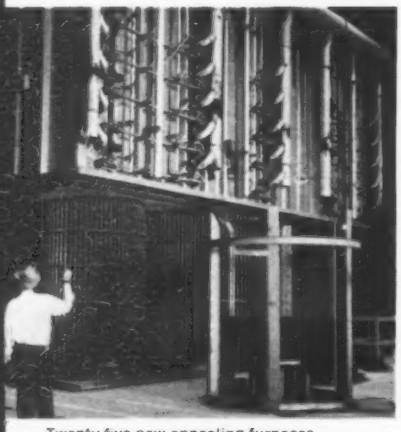
New horizontal scale breaker



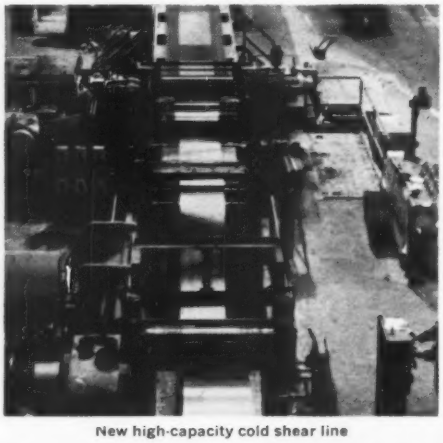
New $12 million reversing roughing mill



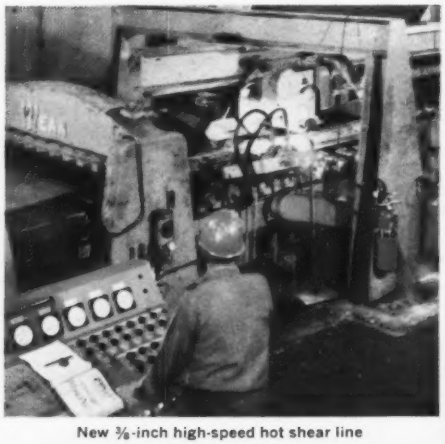
New punch-card controls for quality control



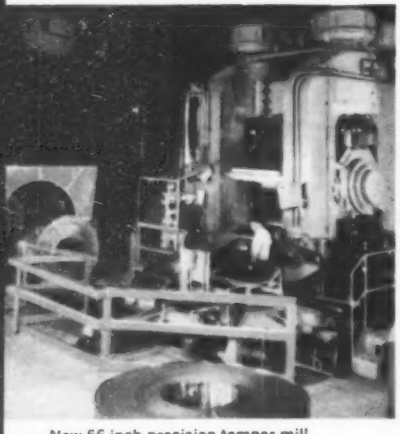
Twenty-five new annealing furnaces



New high-capacity cold shear line



New ⅜-inch high-speed hot shear line



New 56-inch precision temper mill

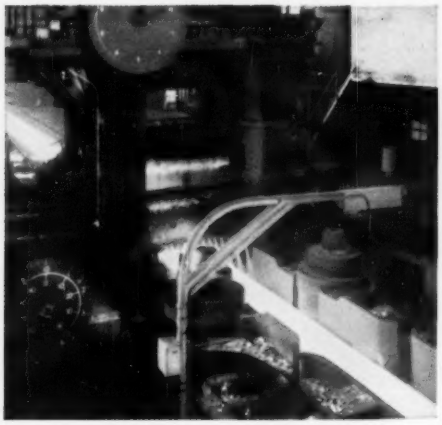
New $36 million, 44-inch hot strip mill

Improved 96-inch hot strip mill

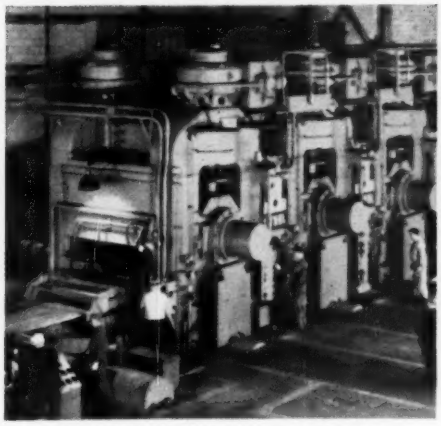
New ingot re-heating furnaces in all steel plants

New $17 million, 68-inch blooming mill

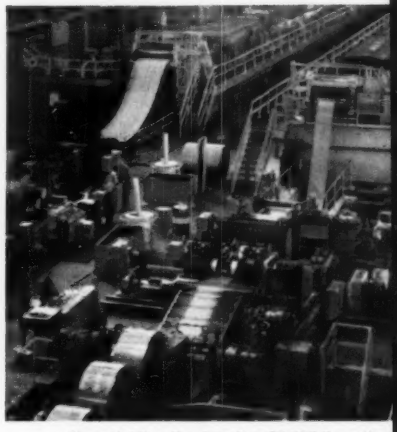
New automatic oxygen scarfer



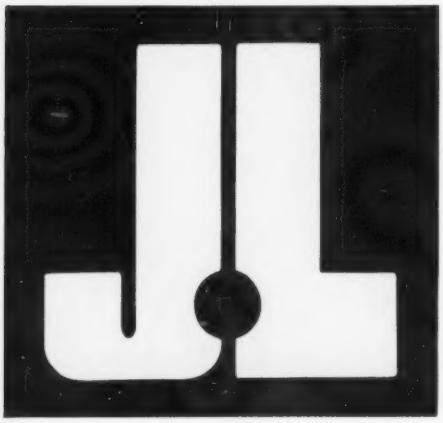
Vertical edgers to assure accurate coil width



World's fastest cold reducing mill of its kind



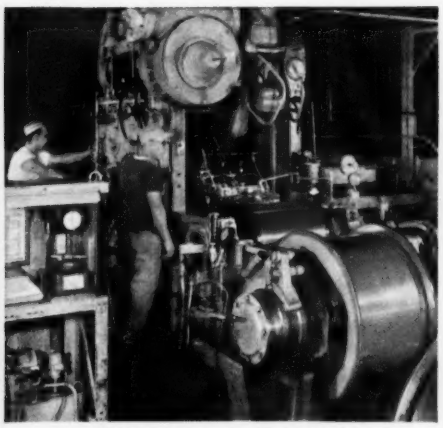
New pickling line handles 60,000-lb. coils



There is a new J&L, which has invested nearly 800 million dollars in new and improved facilities . . . more than twice the company's total value at the end of World War II. This gives us greatly-expanded production capacity, and enables us to be a steady, dependable source of supply for carbon and stainless sheet and strip, and many other products, to present customers and customers we never served before.

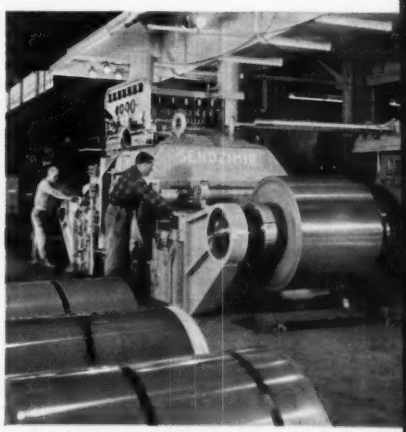
Jones & Laughlin Steel Corporation

PITTSBURGH, PENNSYLVANIA



Strip steel, a new product for J&L

New $6¼ million Sendzimir galvanizing line



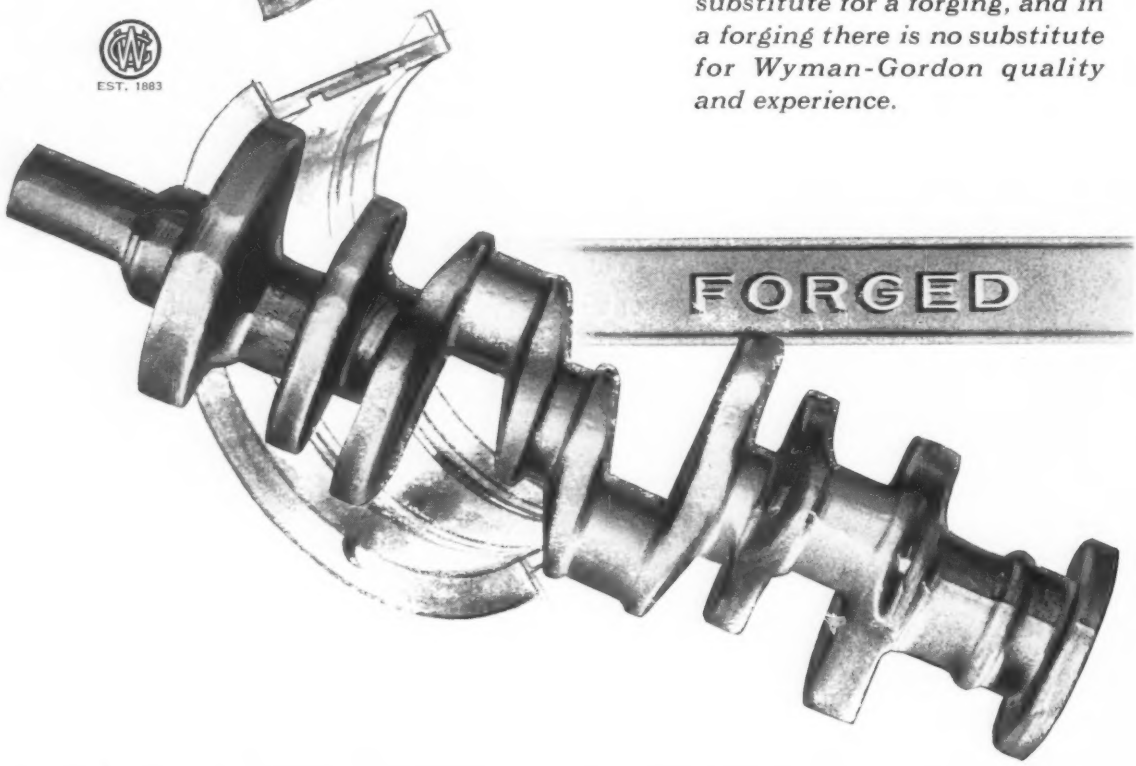
New $62 million stainless steel facilities

A Bearing's Best Friend

Crankshafts have been made successfully by other methods of fabrication and have proven good enough for certain non-critical applications — but for maximum dependability of the modern, compact, high-compression, high-torque, heavy-duty engine a forged crankshaft is essential.

In a crankshaft there is no substitute for a forging, and in a forging there is no substitute for Wyman-Gordon quality and experience.

EST. 1883



WYMAN-GORDON

FORGING

Aluminum Magnesium Steel Titanium Beryllium Molybdenum Columbium

WORCESTER MASSACHUSETTS

HARVEY ILLINOIS
DETROIT MICHIGAN
GRAFTON MASSACHUSETTS
FORT WORTH TEXAS
FRANKLIN PARK ILLINOIS
LOS ANGELES CALIFORNIA

Technical Outlook

HANDLES PICKLE WASTES— A new process described as a "breakthrough" is said to eliminate the waste acid (it's recovered) problem and provide electrolytic iron as a byproduct. The developer, Ionic Inc., Cambridge, Mass., says an installation which could handle waste from a mill which uses 50 tons of sulfuric acid per day would cost about $700,000, eliminating about $500,000 per year in acid and waste disposal costs.

NEW PRODUCTION TOOL— Extremely high pressures (millions of psi) may hold the answer to harder metals with higher melting points than the best we know today, suggests Rustum Roy, professor of geochemistry, Pennsylvania State University, University Park, Pa. Such high pressure research has already put diamonds on a production basis. Next step will be metals. Tests on the mineral olivine (magnesium iron silicate), for example, show it becomes metallic at less than 15 million psi.

CORROSION BATTLE CONTINUES — A brighter, more corrosion resistant aluminum alloy (5657) has just been announced by Reynolds Metals Co., Richmond, Va. Sharpness of image reflection is said to be 15 per cent better than 5457 but the price quoted is the same. Prediction: Look for it soon on new autos.

SUCCESSFUL SPACE ENGINE—Republic Aviation Corp., Farmingdale, N. Y., says a magnetic pinch plasma engine it developed has been running more than 118 hours. The light, "fuel-miser" unit was described as a major advance in efforts to build controlled satellites for world surveillance.

BEARING PROBLEMS GROW— Some of the fantastically precise steering devices for our newest defense machines require bearing accuracies within 1 ten millionth of an inch, a reliable source reports. Accurate measurements in that area constitute one of the greatest technical problems facing military people. To date, the best effort of National Bureau of Standards, Washington: 1 millionth—ten times greater. The bureau has a program underway headed for the 1 ten millionth goal.

QUARTZ LAMP HEAT GAINS— Some of the most remarkable brazingwork being done today can be attributed to the development of heat sources which use quartz heat lamps, claims an Air Force observer. "One of our contractors is doing some (classified) joining no one else has been able to accomplish."

PROLIFIC AFRICAN ORE—American Smelting & Refining Co., New York, is extracting 18 elements from one Belgian Congo ore: Zinc, copper, gold, silver, cadmium, bismuth, antimony, arsenic, sulfur, selenium, tellurium, thallium, germanium, indium, nickel, palladium, rhodium, and platinum.

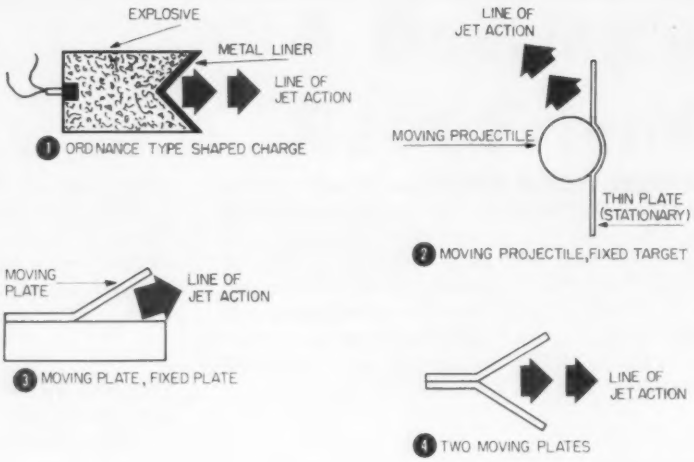
INSTRUMENT WEIGHT CUT— Kelsh Instrument Co., Baltimore, gained rigidity for its mapping instruments without sacrificing lightness by switching to a high strength aluminum alloy, called Tenzaloy. The move has already paid off in increased sales, the firm claims.

MESH OUTPUT SPEEDED— A new resistance welder will cut changeover time for patterns by perhaps 10 per cent at Keystone Steel Co., Peoria, Ill., claims National Electric Welding Machine Co., Bay City, Mich. Eight-hour output: 60 tons of mesh 17 ft wide made with $\frac{1}{8}$ in. to $\frac{1}{2}$ in. wire. Delivery will be made early this spring.

FREEZING THE RECORD— To make permanent records of oscilloscope patterns, Fisher Body Div., General Motors Corp., Detroit, hooked Polaroid cameras to some of its 'scopes. You can do likewise. Several firms offer adapter kits to make the installation job easier.

Authority John S. Pearson heads dynamics of physics research at the Naval Ordnance Test Station, China Lake, Calif.

Four Ways to Produce Welds



The four systems shown above will produce metallic jets that join metals. The basic idea involves angles between metal pieces and unsymmetrical loading. Two pieces moving rapidly toward one another with an included angle for collapse will produce surface jetting (note the wave-shaped micrograph). Too much speed displaces the tiny wavelike jets; too little gives no interaction. The right speed produces jetting and interaction and permanent bonds.

Navy Expert Outlines ABCs Of Explosive Metalworking

This roundup article covers the fundamentals of the process, the operations that are feasible today, and the influence of explosive charges on the materials being worked

IF YOU'RE already doing explosive metalworking, or planning to get into it, you can benefit from information developed by John S. Pearson and his associates at the Naval Ordnance Test Station, China Lake, Calif.

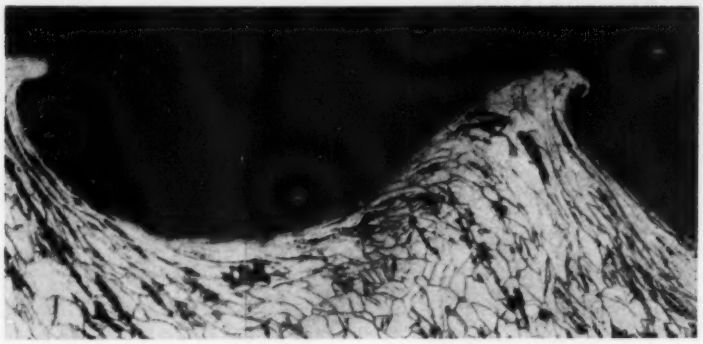
The group's findings will give you greater insight into fundamentals and increase your knowledge about what's needed for top-rate results.

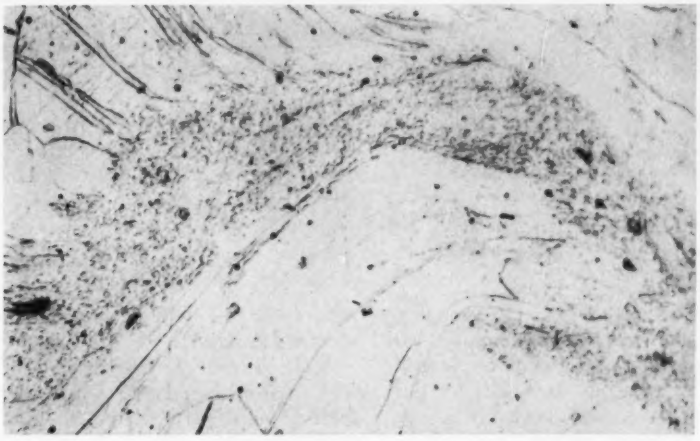
Here are some of Mr. Pearson's general observations about explosive metalworking: "Its greatest potential lies in three areas: 1. Making parts beyond the capacity of conventional methods. 2. Producing odd shapes and handling unusually tough metals. 3. Saving equipment and labor in producing some kinds of short run items."

Fundamentals You Need

Say you want to make a 5 in. ash tray about 2 in. deep. You'd need an explosive, a medium to transmit its shock wave, and the bottom half (female) of a die which includes some way of getting rid of pressure during forming.

Each of those items represents a variable which affects the opera-





tion: Low explosives will work, but you could improve efficiency of the charge by putting it into an enclosed type of press. High explosives (TNT, PETN, RDX) also work well, but some develop 4 million psi, so you will have to use them out of doors. The distance you mount the explosive above the workpiece is important, and the shape of the explosive also affects results.

For a transmittal medium, you can select water, air, liquids, or semisolids (most operators choose water). If you select air, a coating on the metal surface will protect it from the scouring action of the explosive particles—grease or plastic is often employed. Both vacuum and air vents relieve the pressure on the back of the work.

An explosive does its work with a pressure pulse—its duration and magnitude are important to know. A high explosive detonates in millionths of a second; low explosives burn in thousandths of a second. How fast the pressure pulse travels from the explosion through the work depends on the material: The pulse is faster in heavier materials than light ones. Inside the metal, particles also move—the more the energy, the faster they go. If the rate is too fast for a particular metal, you can break it (sometimes desirable, as in cutting).

In some situations, the way a load is released is just as important as the way it's applied. If you put the explosive in direct contact with the ash tray blank, for example, the blank compresses rapidly like

What You Can Do With Explosives

CONTACT CHARGES

(In contact with work)

Fracture
Severe work harden
Extreme flow
Extreme elongation
Weld
Compact Powders

4 million psi

200,000 psi

Cut & Try Area
Various combinations of contact and standoff results (above and below)

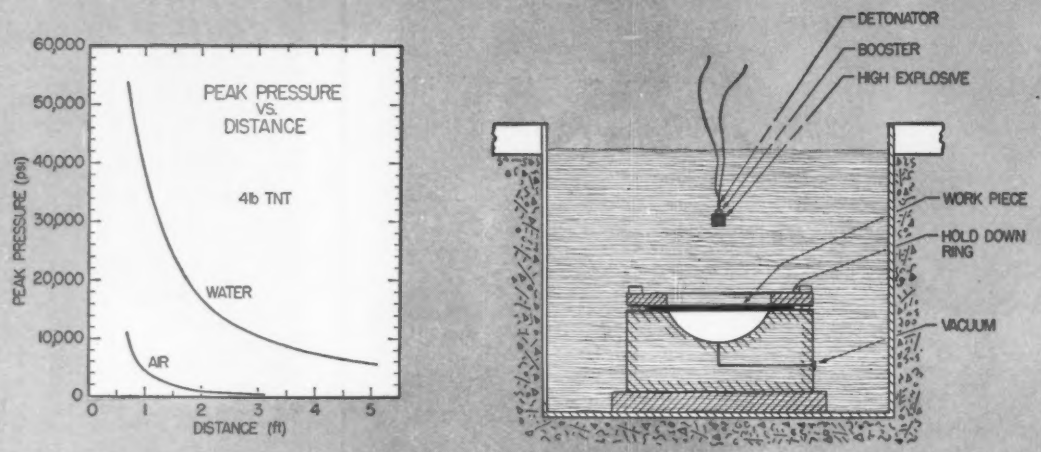
20,000 psi

STANDOFF CHARGES

(Charge not in contact)

Deep drawing
Embossing
Flanging
Joggling
Shaping & sizing
(Results are similar to those of regular press operations)

How Distance, Medium Affect Force



Graph illustrates great flexibility of working force delivered by a fixed amount of explosive. Most popular type of tooling setup (right) puts charge some distance from work in generous size water tank

a spring. If the pressure decays or lets up too rapidly after the explosion, the material will overextend itself (bounce back) too fast and fracture or badly distort the piece. The solution: Simply lengthen the time the load is applied—a slower burning explosive is one way; confining the explosive is another.

Plenty of data are available on how fast explosive energy (stress waves) travel through metals. By recognizing the fact that the waves reflect from surfaces and bounce around inside a metal, a specialist can predict exactly how a metal will react to an explosive in contact with its surface.

What You Can Do with It

The ash tray is a simple example of forming. You can also bring parts up to size, work harden, forge, extrude, weld, and compact metal powders with explosive forces. Sheet metal is the most widely used form.

Most operators prefer to mount the explosive at least several inches away from the work when handling sheet metal. Some of the heavier operations—forging, extruding, hardening—require the explosive in direct contact with the work (Du Pont has a sheet explosive for that purpose—STEEL, Nov. 23, 1959, p. 74). Occasionally, multiple charges are employed to spread the force. For the largest parts (tank ends or heads, for example), you will probably prefer high explosive and a large, water filled pit.

• Die construction is similar to standard types, but you have a wider choice of materials—running from plaster to regular tool steels. Venting is built in. Sometimes you don't need a die.

Hold-down rings keep a blank in place during the explosion and prevent wrinkling in large pieces. Variations in clearance run from 0.001 to 0.002 in. to a fairly tight fit.

If you decide to use a vacuum behind the blank, some sort of a seal is needed. Some like a rubber O-ring; others use a simple layer of grease; occasionally, no seal is used.

Special venting techniques behind the workpiece are often quite successful. Mr. Pearson mentions a Canadian that forms cones in such a die. (See STEEL, Dec. 7, 1959, p. 152).

Large, water filled pits often trouble those who are just starting. There's one way around the problem: A water-filled container on top of the die. (The explosive is mounted inside.)

Some people get double mileage from sizing operations. They produce finished parts from a preform made conventionally and also repair conventionally made parts which don't measure up to specifications.

Don't overlook the possibility of dieless forming, suggests Mr. Pearson. Simple flanging operations, some embossing, or dimpling can be done without any tooling.

• China Lake researchers report on compacting, powder forming, and welding.

Explosive charges change the physical properties of individual metal powder particles.

To get the kind of pressures needed to form powders into parts, you must use a press with a piston that is in direct contact with the explosive. Several types have been successful at China Lake, comments Mr. Pearson.

"At first, we put metal powders inside a ductile tube and wrapped the explosive outside. But the charge collapsed the tube around the powders inside. We learned some new things, but we fractured a lot of metal and lost specimens."

More successful presses have one

or two opposed pistons which are forced against the powders. Mr. Pearson has produced experimental parts from titanium filings, iron oxide-aluminum powder mixes, and by bonding layers of dissimilar materials like iron and titanium.

Here are some of his conclusions about compacting: Final density is related to material ductility. Titanium, for example, presses down to about 75 or 80 per cent of its theoretical density, but you can get ductile titanium filings down to better than 95 per cent, "and we haven't yet reached the limit of such densities," he states.

"We have concluded you've got to have some ductility in powder materials—they flow plastically to a considerable extent forming a good, strong bond. But brittle materials seem to end up as much smaller particles. You get good compacting properties but little bond strength. One solution may be mixing brittle and ductile powders," concludes Mr. Pearson.

In explosive welding, the China Lake group uses two techniques: 1. Workpieces are placed in contact and subjected to a normal underwater blast as in forming. 2. Parts are jetted together with explosives in contact with the metal (see illustration Page 140). Both approaches have worked well with a variety of metals.

A possible welding application: Buttwelding of crosscountry pipelines.

What Explosives Do to Metal

Experts still don't all agree on how metals behave under explosive conditions. The operation one company praises is damned by the next.

The China Lake people think some of that confusion comes from the fact that a wide range of metals and operations are usually discussed. Obviously, results aren't always comparable.

You can better understand how explosively treated pieces will behave by thinking of material particle speed rather than stresses. Particles can travel just so fast in a metal. When you exceed the limit, the metal breaks. (The point is called the critical relative particle velocity.)

Reflection is another factor. When you put an explosive in contact with a sandwich of dissimilar metals, the impulse or wave reflects off the surface between them. A compression wave (pulse) will travel through steel, for example, until it hits a steel-aluminum interface. About half the energy goes right on through, but the other half bounces back to the starting point and complicates the internal stress picture.

• Explosive forming definitely increases the amount of stretching or forming that can be done in some metals, states Mr. Pearson. Forming conditions are important too.

Authorities have pretty well nailed down the fact that when you speed up the forming, you can raise yield and ultimate strengths.

Tensile tests of metal parts moved by an explosive don't give such clear answers on elongation. If you speed up the impact, you don't always get more elongation, finds Mr. Pearson. Some metals show increases in elongation; others show decreases.

One conclusion: With low carbon steels, you can get a tremendous increase in the amount of forming done without danger of breaking the metal.

Results such as those, says Mr. Pearson, are extremely valuable in setting up an operation if you interpret them correctly. Some people try to guess end results by extending graphs and tables way beyond test results without taking other factors in consideration. For example, you can superstretch a steel specimen by immersing it in a liquid at a pressure of 1 million psi. At first glance, you might believe explosions would give you similar results, but you'd be mistaken—1 million psi in a liquid distributes itself evenly on all sides of a specimen, while practically all explosive forces come from one side only.

Metal behavior is going to get the major share of research attention in the near future, says Mr. Pearson.

Summing It Up

"In the next few years, we predict many changes in the methods of applying explosives to metals. So far, there has been much emphasis on conventional forming of sheet metals. But investigators are beginning to realize that explosive metalworking is unique—it's not a new way to do an old job.

A final word of caution: "The explosive approach isn't a cure-all. If you can do a job economically conventionally, don't try explosive forming."

Explosives Shape These Materials . . .

Aluminum	Stainless	Others
1100	302	Airsteel 200
2014	304	C. R. Steel
2024	310	Hastelloy C
3003	316	Hastelloy X
5052	321	Inconel
5086	347	Inconel X
6061	AM 350	Monel
7075	15-7 PH (Armco)	Multimet N155
	17-7 PH (Armco)	Unilloy 19-9 DL
		Unimach II
Magnesium	Titanium	Vascojet 1000
A2 31 B Mg-Al	Commercially pure	4130 Steel
HK 31 A Mg-Th	6 Al 4V	4340 Steel
	8 Mn T	
Refractory Metals	Copper & Brass	
Molybdenum	Cartridge Brass (70-30)	
Tantalum	Admiralty Metal	
Columbium	Beryllium Copper	
	Silicon Bronze	

You Can Gage to Millionths, but . . .

"When you become interested in a least tolerance of 30 millionths, there is much more than just the gage to consider. You must place fully as much importance on creating a special environment in which it must operate"

—Lou Heinold
Federal Products Corp.

IF you are planning on manufacturing to tolerances of 100 millionth of an inch or less, your introduction to high order precision may be an eye opener—particularly when you consider your ability to measure the parts you produce. Gaging at that level takes on a completely new look.

• Here is how the problems are expressed by one company.

In a memo to a company salesman, Lou Heinold, manager of the Automatic Control Engineering Dept., Federal Products Corp., Providence, R. I., cited some of the complexities facing a bearingmaker who wanted gage readings in terms of 10 millionths of an inch. Part tolerance was 30 millionths. Here are the points he listed:

When you work at the usual tolerances (0.0005 in. or broader), the quality of the gage is usually the main (if not the only) consideration. However, when you become interested in a least tolerance of 30 millionths, there is much more than just the gage to consider. You must place fully as much importance on creating a special environment in which it must operate.

But before thought is given to environment or gage, there must be a decision about what should be measured—the size of the part, or the relationship of the part to another part. The answer can make a great deal of difference in the cost and difficulty of getting needed results.

At these tolerances it is much less difficult, and often more effective, to check part relationships (clearance, for example) instead of part dimensions. Whether to place emphasis on relationship or size is a subject of itself. So is product geometry (such as roundness, straightness, surface finish).

• If it must be size, and the part tolerance is 30 millionths, new methods of production measurement will be needed.

Using a rule of thumb, the gage should have a repeat accuracy of 3 millionths. The same goes for the master used to set the gage. Such accuracy might be practical at the present state of the art. But for us to be sure that both the gage and its master have such accuracy, we would need (by the same rule of thumb) a standard which is accurate to 3/10 of 1 millionths of an inch! No one is making masters or gage blocks that accurately—yet.

Obviously, some modifications of the rule must be made. For example, it is logical that this gage should be set directly with a gage block, just like we manufacture and measure master rings.

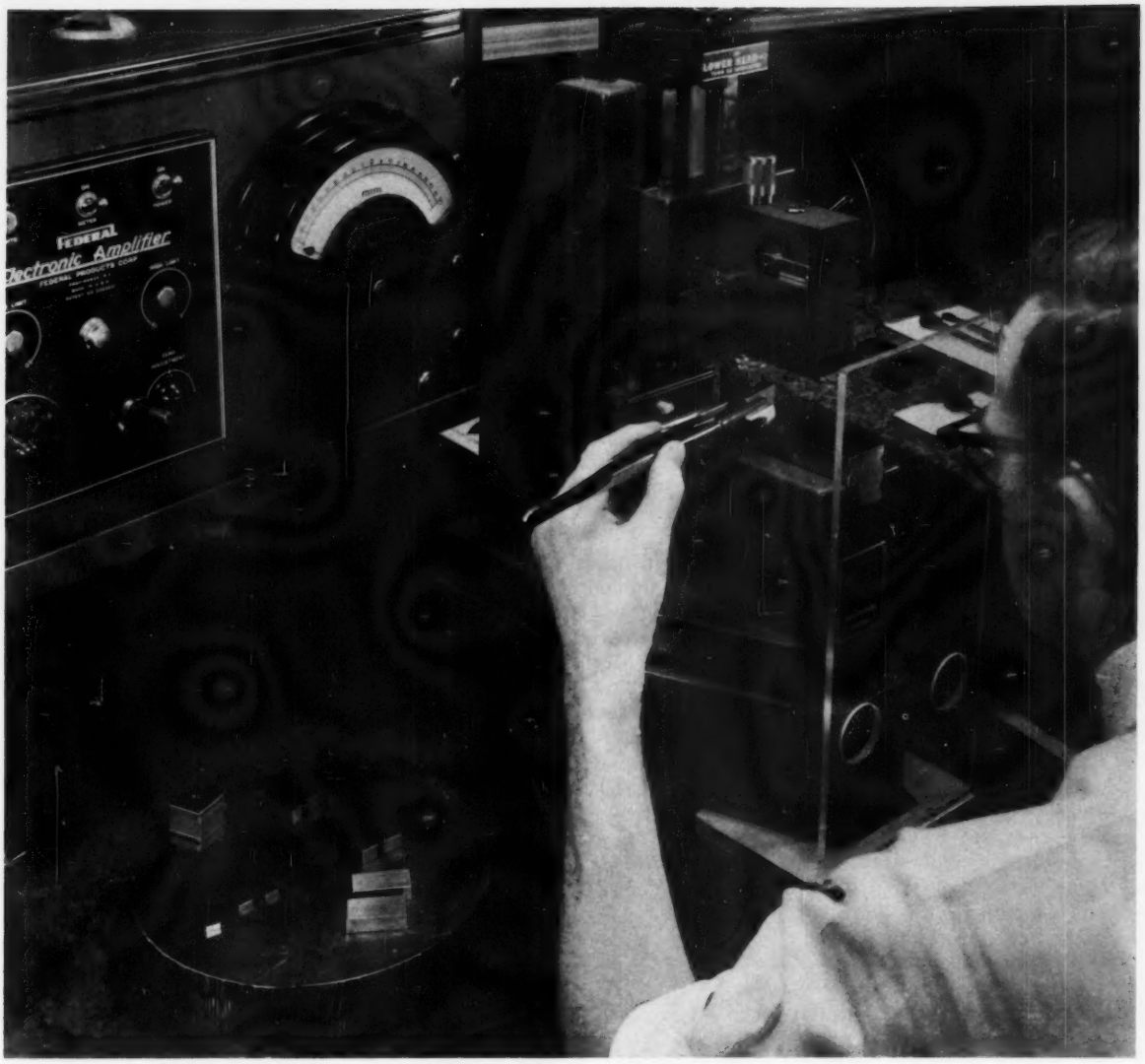
• If changes to the old rules are made intelligently, there is a good chance of success if there are no environmental influences which impair gaging accuracy.

We all know the influences, but, unfortunately, they are too often underrated. Particular attention must be paid to temperature and cleanliness.

Within limits, temperature itself is not as important as its constancy and the degree to which it is shared by the gage, its master, the part, and the surrounding atmosphere. For example, if you are checking the diameter of 0.5 in. bore, a difference of only 1 degree between the part and master is likely to introduce an error of about 3 millionths. If, in addition, room temperature shifts a few degrees, or the operator's breath is allowed to reach the gage for any length of time, you can easily introduce another few millionths error. No one worries about such error at normal tolerances, but it's disastrous when gaging to the accuracies we're considering.

• Here are some of the things that will help provide the needed environment:

1. Parts and masters should be placed on a heat sink (a large steel plate used as storage place), so they can be brought to the same temperature and held there. Even with a heat sink in use, normalizing will probably take hours. Gaging must take place in a constant temperature room, and the operator must measure the parts without touching them. Insulated tweezers or a similar handling device will have to be provided.



Peering through a plastic breath shield, operator uses tweezers with insulated tips to place parts under gage. Parts are stored for several hours on circular heat sink (lower left) in temperature controlled room until they stabilize at room temperature. The electronic gage shown can be set so each line on meter equals 1 millionth of an inch

2. Assuming that all recommendations in No. 1 are followed, it will still be necessary to check the gage frequently and compensate accordingly. At these tolerances, no one can predict how much the opening of a door to the room can upset the temperature equilibrium. That's why a well designed gageroom must be part of the over-all project.

3. Usually, the operator sits in front of the gage. If so, a plastic breath shield should be provided and its use made mandatory. Better still, provide an enclosure for the entire gage area and obtain even closer control of temperature.

• The problem of dirt can be more troublesome than temperature.

Dirt particles, or film which is virtually invisible, can easily cause serious repetition errors.

1. It will be necessary to chemically clean the entire gaging area periodically. There's no way of predicting how often. Experience will probably determine it.

2. Cleaning of parts will vary somewhat, depending on shape, material, and size, but methods and cleaning fluids will have to be studied because some, as good as they are, will leave a residue that can't be ignored at these tolerances. And don't forget, the residue may build up on the gage contacts after repeated measurements.

Taking all factors into account, it's easy to see that it takes thorough planning, careful personnel selection and training, and a sizable investment before you are ready to gage 30 millionths successfully.

Concluding his note, Mr. Heinold cautions: "Inadequate gaging facilities, though appealing on an installed first cost basis, can ruin the economics of the job when they are put to work. And it can cost even more to try to rectify a bad decision."

Are You Ready for Numerical Control?

If not, chances are you will be in the next five years. Here are some of the factors the experts say should be included in your planning before you put the system to work

NUMERICAL CONTROL can work miracles in many production shops, but some people seem to think you can get such results by doing no more than buying a machine and plugging it in.

• It's not that easy. Both builders and users say planning before the machine is installed is a must.

Listen to E. M. Ferris, plant manager, Pratt & Whitney Co. Inc., West Hartford, Conn. His company makes numerically controlled machines, and, as a production man, he's a successful user.

"Planning is of paramount importance to the success of numerical control operations in your plant. It should start on a plant-wide basis well in advance of the scheduled delivery of equipment."

What are the most important subjects to be considered? Mr. Ferris lists these: Process planning, parts to be processed, operators, installation, and maintenance.

For process planning, personnel must be selected and trained for the new machine technique. Mr. Ferris points out that it is essential these men have machining experience, in addition to knowledge of mathematics and tool engineering.

• The operators and maintenance men, and the way you train them, can make or break the job.

Some prospective users have the idea that the machines run themselves and can be watched by a laborer who spends half his time reading the comic books.

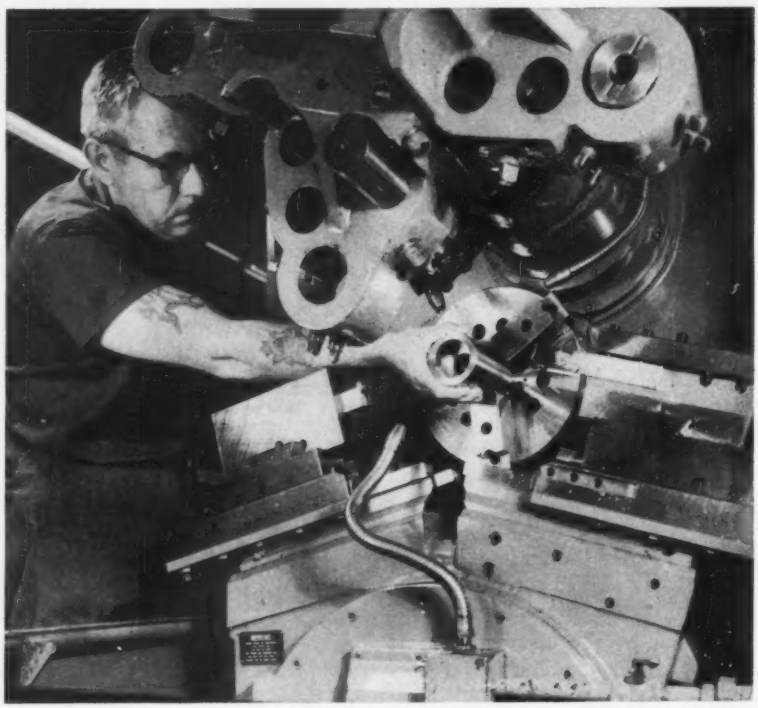
Builders counter this way: The operator should know machining, so he can spot feeds that are too heavy, can detect the chatter that signals a worn cutter, can analyze the programed sequence for efficiency, and tell the programer when it can be improved.

As one user told STEEL: "A good operator on a numerically controlled machine tool completes the information circuit we count on to get maximum efficiency. He is the feedback element in our programing success."

Maintenance is also a vital factor. Today's numerical control systems have rung up fantastic records of troublefree operation, but they can fail. And because the productivity of the machine can be so great, an hour's downtime may cost as much as a complete shift with a manually operated counterpart.

With that kind of responsibility on the maintenance men, it will pay to get your equipment builder's maintenance recommendations. Nearly all builders will offer to train your maintenance man, even before your machine is installed.

As a final consideration, the production scheduling men should become acquainted with the numerical control system you plan to get. They'll need to re-evaluate the time it takes to make some parts. Although feeds and speeds won't change markedly on the new machine, the time needed to set up the job and to manipulate the machine will be drastically reduced. Raw parts will have to move to the machine faster to keep it going. You should also make sure that the parts coming off the machine won't hit a bottleneck when they get to the next operation.



AUTOMATION IN A TOOLROOM is responsible for turning out small lots (15 to 30 pieces) of tool steel casings and die shells at rates up to six times faster than former hand lathe methods. Parts are run on this Warner & Swasey 2AC single spindle chucking automatic machine at Lamson & Sessions Co., Cleveland

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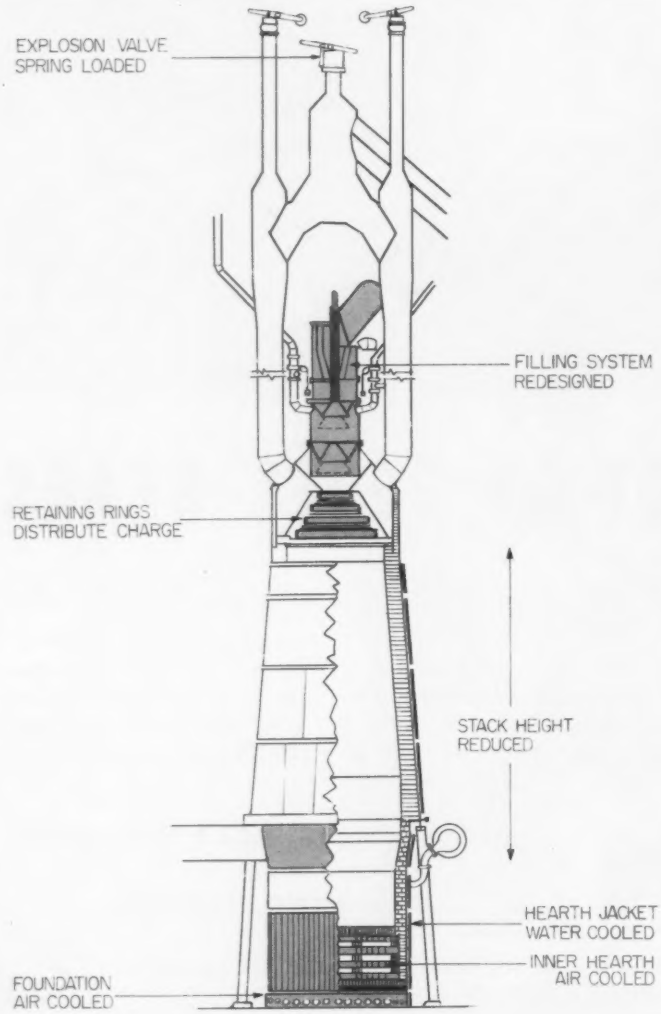
†REG. U.S. PAT. OFF.

Ultrahigh Pressure Stack Boosts Hot Metal Output

An expert says blast furnace productivity could be doubled by redesigning the stack and operating it at top pressures far beyond those now used. Recommended: 40 psi

Here's how the size, charging equipment, and cooling system of the blast furnace may be modified to handle top pressures up to 40 psi:



STEELMAKERS are looking eagerly for ways to boost blast furnace top pressures so they can increase the output of present stacks or build greater productivity into new ones.

A blast furnace operating at pressures several times higher than any in use is proposed by Owen R. Rice, consultant, Koppers Co. Inc., Pittsburgh. The increased capital cost of such a furnace is more than justified by the decreased production costs it offers steelmakers, says Mr. Rice.

• The ultrahigh pressure furnace would require less than $3 million additional capital, but it should yield an extra 700,000 tons of iron a year.

In a steel plant requiring 1.4 million tons of hot metal a year, management might build two, normal pressure, 2000-ton-a-day stacks, or one, ultrahigh pressure, 4000-ton-a-day furnace. Cost of the high pressure furnace: $14,760,000 vs. $22 million for two normal pressure stacks. Capital cost per ton of pig iron would be $2.49 instead of the $3.61 for two-furnace operation. And operating costs per ton would run about 70 cents a ton less. Total saving per ton of iron from the high pressure furnace: About $1.82.

• Some present stacks are operated at elevated pressures.

About 260 furnaces are in operation in the U. S. Operating statistics for 76 of them—all with hearth diameters of 25 ft or more—were studied by Mr. Rice. High back pressure was used on 16; the others operated at normal pressure.

Top pressures up to 9 psi have been applied to one furnace operated by Republic Steel Corp.

With an orifice plate washer, furnaces operated by Jones & Laughlin Steel Corp. can carry 3 to 4 psi top pressure; without the washer, they can be operated at 1½ to 2 psi. Jones & Laughlin's furnaces being built in Cleveland may carry a top pressure of 5 to 7 psi. A Jones & Laughlin furnace that is still in the design stage may carry up to 12 psi top pressure.

Furnaces operated by United States Steel Corp. carry top pressures of 3 to 12 psi.

Greater productivity is usually associated with high top pressures,

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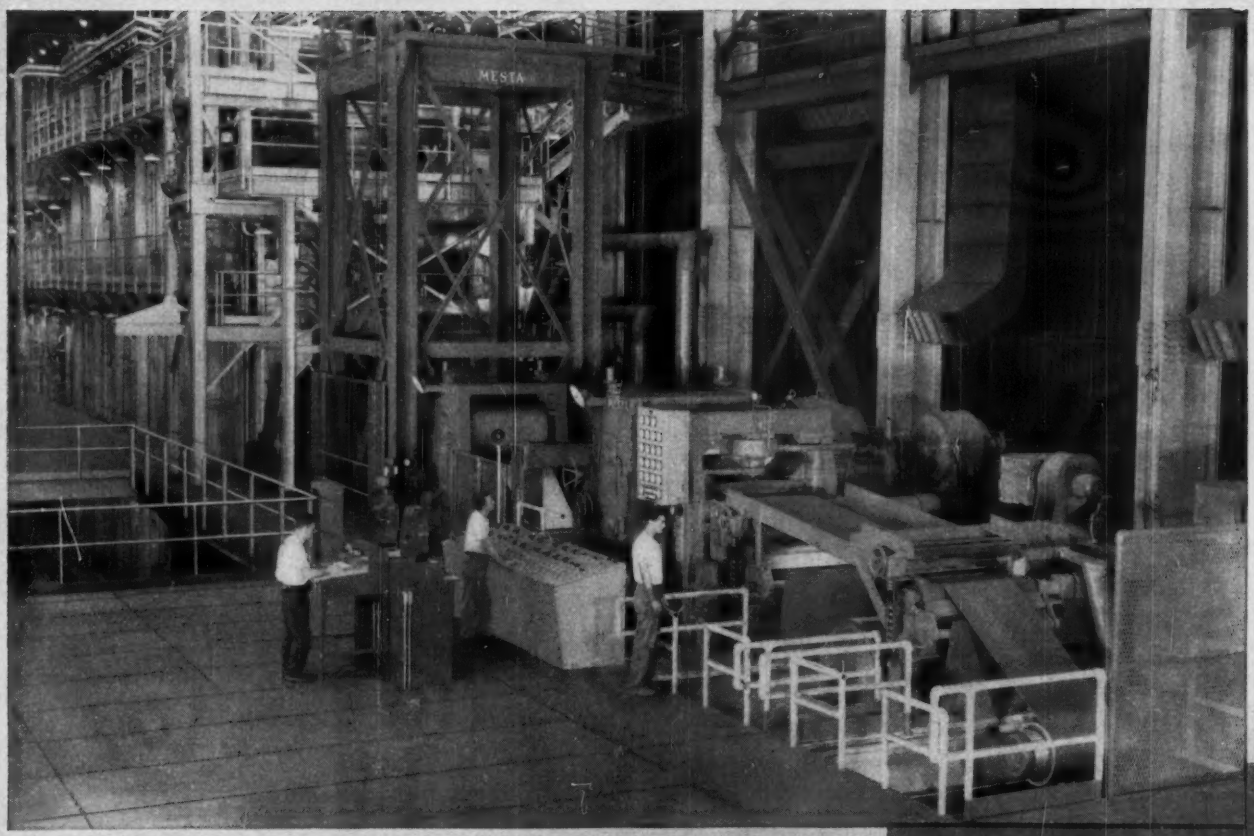

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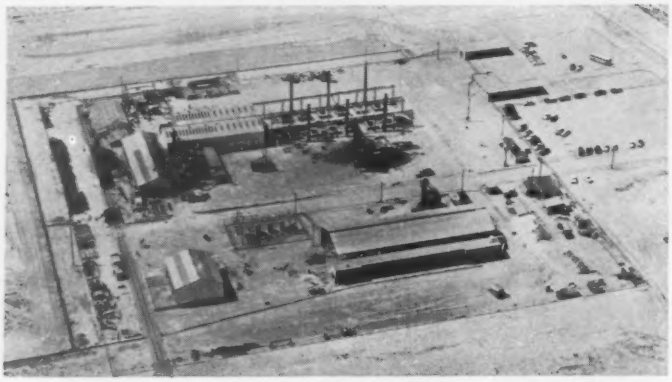

The GLC graphite plant at Antelope Valley, California.

We are glad to inform the electrometallurgical and electrochemical industries in the Western States area that we recently acquired the plant and physical assets of Crescent Carbon Corporation in California.

Carbon and graphite users in the Western States and those overseas in the Pacific area will shortly have a greatly improved source of supply at their command.

Plans now under way at the GLC graphite plant, Antelope Valley, California, call for a substantially increased inventory of electrodes, anodes and mold stock, not only in tonnage but in a variety of shapes and sizes as well. Customers can look forward to faster service on their shipments and to closer cooperation in solving their technical problems.

Technicians from our plants at Niagara Falls, N.Y. and Morganton, N.C. are establishing the most modern production techniques at the Antelope Valley plant, so that its products will meet established GLC standards of quality and uniformity.

As these forward steps are taken, we hope to have the privilege of widening the scope of our service to customers, old and new.

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but steelmen have to use some yardstick to measure blast furnace performance. It is often measured by the amount of coke consumed per day. That amount depends on the effective hearth area (inward from the tuyere noses to the mass of incandescent material at the hearth center, where no reduction occurs).

One measure of performance often used is called the Freyn rating. A rating of 100 per cent indicates coke consumption of 6300 lb per day per square foot of hearth area (assuming the coke has a fixed carbon content of 86 per cent). Average rating of furnaces in the U. S. is about 97 per cent. The ultrahigh pressure furnace should operate at 200 per cent.

• Partial closing of the blast furnace gas outlet increases output tonnage and cuts flue dust losses.

Application of high back pressure to the blast furnace was suggested by Sir Henry Bessemer in 1871. The principle was tested in the U. S. by Charles L. T. Edwards, from 1921 to 1925, at a steel plant near Lake Erie. A patent was issued to Mr. Edwards in 1929, for operation of a blast furnace under high back pressure. The practice was found to boost hot metal production and decrease dust losses from the stack.

In 1936, an article written by Ernst Diepschlag, a researcher in Breslau, Poland, described experimental reduction of iron ore, at various pressures and temperatures, in carbon monoxide and hydrogen. Standard lumps of red iron ore were checked for percentage of reduction during a half hour test period; reduction was found to increase rapidly as pressure was elevated, until pressure reached 3 atmospheres (absolute). Beyond that pressure, the reduction rate decreased in a hydrogen environment. In a carbon monoxide environment, it continued to increase but less rapidly.

Steelmen can apply Mr. Diepschlag's findings to blast furnace operation by determining the most beneficial back pressure.

Theoretically, a top pressure of 30 psi (about 44.7 psi absolute) should more than double the reduction rate realized at normal top pressure—50 in. of water, or about 1.8 psi. But blast furnace conditions may demand more pressure to produce the desired acceleration in reduction, so Mr. Rice recommends a 40 psi top pressure. That would permit the blast furnace driving rate to be doubled; a furnace large enough and charged with the right materials to turn out 2000 tons of hot metal daily under normal conditions would produce twice that amount when operated at 40 psi.

• Blast furnace design must be modified to handle higher pressures.

The proposed furnace would be built on a 28 ft hearth. It would be charged with an all-beneficiated material—sinter (preferably self-fluxing), oversize lumps up to 2 in., and well screened coke.

The furnace filling device would be unconventional; the big bell and rotating distributor would be eliminated. Two small bells would provide a gas lock. Equalizer and relief valves would insure balanced pressures across the bells.

Charge material would pass through a 7 ft throat below the lower bell onto a burden held in place by heavy retaining rings. The rings, arranged in an echelon, would control the shape and height of the burden. Each skip load would pass immediately through the bells and into the furnace. Skip tubs of 525 cu ft capacity, dumping every 2 minutes, could provide the charge material needed to make 4000 net tons of iron every 24 hours at a coke rate of 1300 lb per ton, allowing 90 minutes catchup time daily.

A photoelectric stock gage, supplemented by a mechanical stock rod, would initiate charging cycles.

Hoppers, bells, and throat would be faced with abrasive resistant material. They would be preassembled for easy replacement.

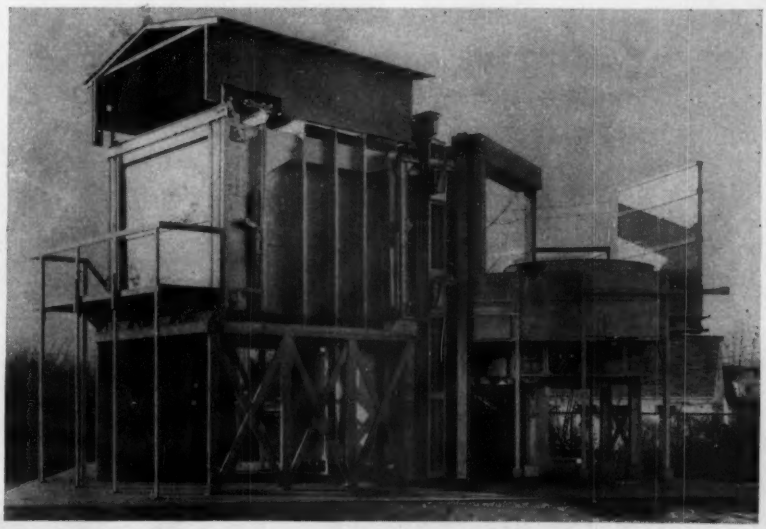
Use of beneficiated charge material and elevation of top pressures would lower top gas temperature and encourage condensation. Gas residence time in the stack might be increased as much as 14 per cent; a 14 per cent reduction in stack height should increase top gas temperature and stop condensation. Mr. Rice suggests a stack height of 72 ft, from tuyeres to stock line, instead of the 82 ft height usually associated with a 28 ft hearth.

The furnace would be equipped with oversize, power actuated bleeder valves and a spring loaded explosion valve that would open automatically if the pressure regulation system failed.

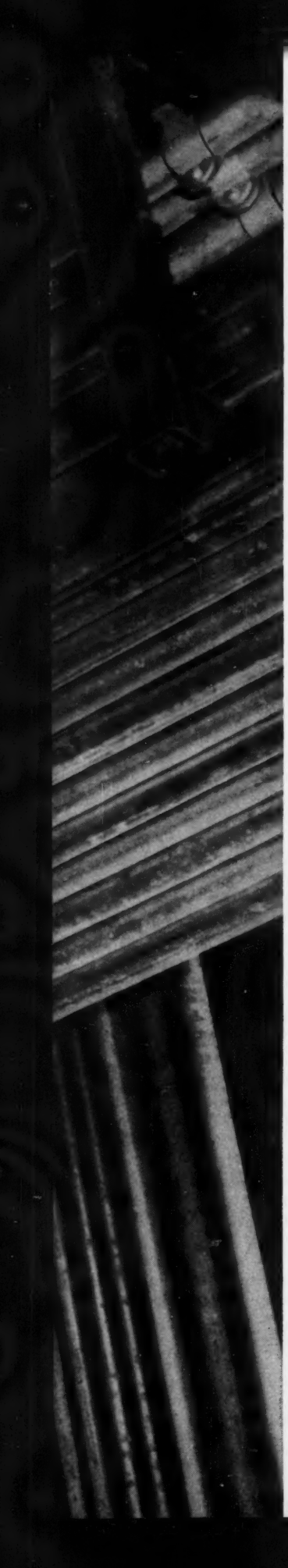
• Unorthodox cooling methods would be applied to the shell and hearth.

The furnace shell would be continuous from top to bottom. To provide greater structural strength, perforations for cooling elements would be eliminated, except for the

(*Please turn to Page* 154)



BIG MOCK-UP represents one segment of an opened coil annealing system developed by Lee Wilson Engineering Co., Cleveland. The detailed model, made largely of plywood, expedited engineering of the process



PROBLEM:

Protection from high-voltage failures due to cable overload.

SOLUTION:

Build up a dependable power system for today and tomorrow—with high-voltage Anaconda Butyl (AB)—insulated Durasheath Cable.

Shutdowns caused by power failures usually entail significant losses; loss of labor during repair time . . . and in some cases, loss of goods in production. This is not to mention cost of repairs, both in labor and in cable. Many such power failures are the result of overloaded circuits—obsolete cables unable to handle the increased loads of today's stepped-up production, or the anticipated needs of tomorrow.

Is your plant's high-voltage electric power system limiting you? Make a careful check of it to find out. Then, if out-of-date or inadequate wiring is a problem, see your Anaconda distributor or the Man from Anaconda—about high-voltage butyl-insulated Anaconda Durasheath.*

High-voltage Anaconda Durasheath (5 kv and up) has been designed to give long life, dependable service. It is insulated with Anaconda Butyl (AB)—resistant to ozone, moisture, heat. Its tough neoprene jacket resists weather, soil conditions, abrasion and mechanical injury.

You can run Anaconda Durasheath from underground to overhead, and into ducts in one continuous run—without splicing. It is light, flexible, easy to handle, economically installed. For further information about Anaconda Durasheath write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Trademark 59261

Durasheath has Anaconda Butyl (AB) rubber insulation for

- extra high resistance against ozone
- exceptional moisture resistance
- 22% more current-carrying capacity than 70 centigrade insulation

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FOR BUTYL-INSULATED DURASHEATH

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If you need precision in small metal parts you can get it from Torrington – plus exactly the right finish, temper and hardness required for your needs. Moreover, Torrington can produce such parts at high speed and a remarkably economical cost. We are the leading specialist in this field – with the specialized skills, engineering experience and facilities to save you money. If you have small parts to be manufactured in large quantities why not let Torrington solve your entire problem. Use the coupon below to get prompt action.

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PROGRESS . . .

(*Concluded from Page* 151)

tuyeres and slag notches. Carbon lining would extend to the furnace mantle.

The shell would be cooled externally by vertical water jackets. The hearth jacket would be cooled the same way. Cast iron hearth staves would be replaced by 2½ in. rolled plates; the mass of metal would provide an additional heat sink in the hearth area.

The hearth bottom would be cooled by air forced through ducts in the concrete furnace foundation.

• **Furnace auxiliaries would also be modified to handle higher pressures and increased production.**

Stoves built to take high pressures would produce a blast heat of 1800° F for 75 minutes, or 2000° F for 60 minutes. Brickwork in the combustion chamber, dome, and upper checkers would have to take temperatures up to 2300° F. Stove valves and fittings would have to take pressures up to 60 psi.

Blowing equipment would have to handle air at 200,000 cfm, 60 psi.

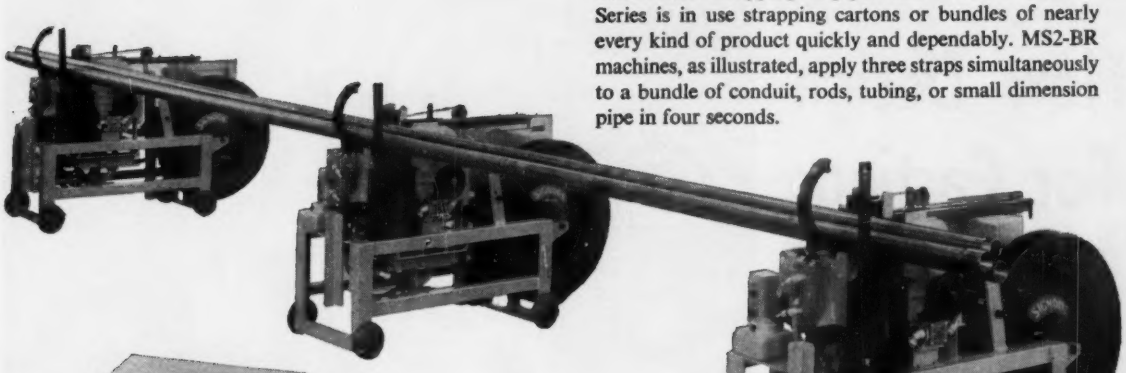
The stockhouse would probably be mechanized or automated; it would no longer hold a 24 hour supply of material. Bins would hold enough ore for 6 to 8 hours of operation, or enough coke for 2 to 3 hours. They would probably be fed continuously by belt conveyors.

Conventional scale cars might be replaced by an automatic charging system.

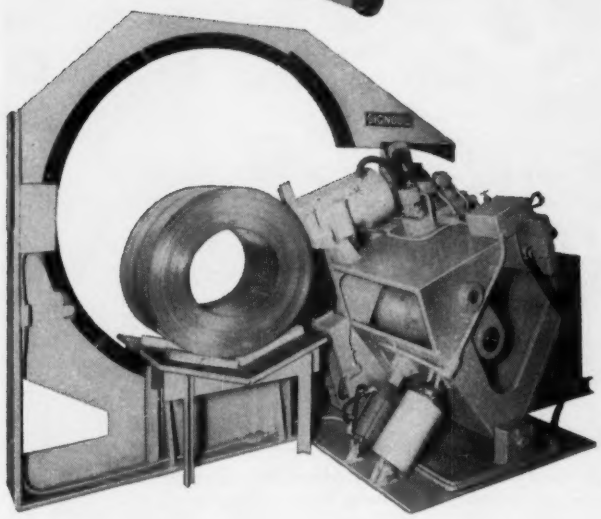
Casthouse capacity would have to be increased. Two tapholes would probably be used; each might have its own trough, skimmer, dam, and cinder fall. Both tapholes might be served by the same mud gun, iron runner, and ladle spout system. Special material might be developed to fill tapholes, which would erode more severely at high pressures.

The furnace would require a relatively small, wet type dust catcher. The gas cleaning system would apply back pressure at the furnace top; it would also use the pressure differential between top pressure and gas delivery pressure (about 39 psi) for cleaning. The system would be made up of automatically adjustable orifice plates. Water would pass through the orifices with the gases, cleaning them, then pass through a sludge recovery system.

Signode machines reduce packaging costs



Push-button strapping of pipe. This "work horse" M2 Series is in use strapping cartons or bundles of nearly every kind of product quickly and dependably. MS2-BR machines, as illustrated, apply three straps simultaneously to a bundle of conduit, rods, tubing, or small dimension pipe in four seconds.



Operatorless circumferential strapping of aluminum coils. Strapping is automatically centered on coils from 30″ to 72″ O.D. The machine straps a coil in less than 10 seconds. Other MH Series machines put 300 to 360 straps per hour on hot or cold strip steel coils or rod or wire coils...have been proved dependable in as much as ten years of the hardest kind of steel mill service.

Every day hundreds of plants prove their economy and dependability

Signode machines strap faster and at less cost—and do it dependably, with uniform tension on every strap. Tensionable steel strapping is low in cost to begin with...and high in strength to ship with. Signode has unparalleled experience in building and applying over 30 different types of these machines. Improved flow, less waste, better handling, safer transit, and lower costs nearly always result. Signode Service includes operator training and fast mechanical service on a local basis, nationwide. All of these machines are available on either an annual rental or single payment basis. It will pay you to talk to the Signode man near you, or write:

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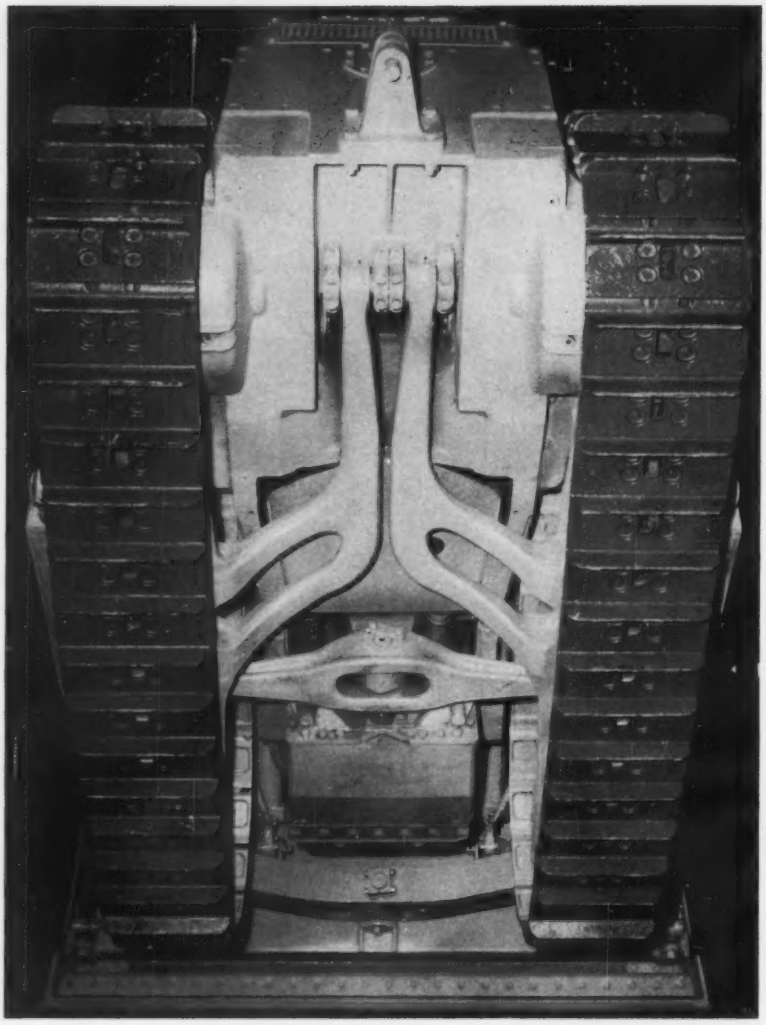
'Flow' Design For Castings Puts Metal Where It Should Be

Eimco Corp. used it in developing a new line of crawler tractors. Results include reduced weight, resistance to fatigue, lower costs, fewer parts. Photos show how principle is applied



Underside of 103 tractor shows diagonal brace and equalizer bar assemblies. Gradual section change is typical of "Stress Flow" design

USE of tailored castings spurred the evolution of a new tractor series for the Eimco Corp., Salt Lake City, Utah.

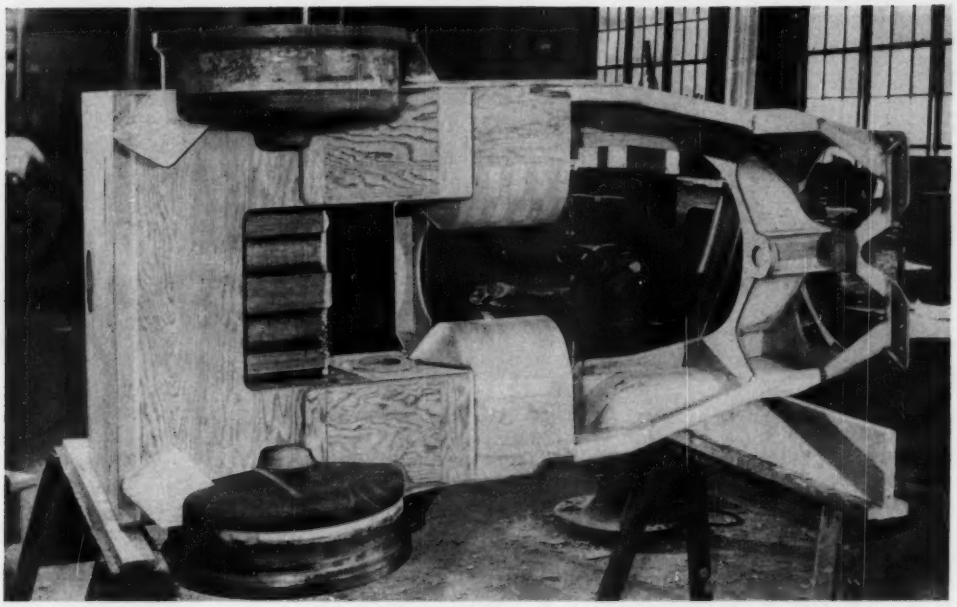
Benefits include weight reduction, high strength, and rigidity.

The company's design concept (called Unitized Stress Flow) is the key to the improvements: The location and distribution of stresses to be encountered in service are carefully studied. Castings are designed to place the metal where it is needed; sections where the load is light are reduced; so stresses "flow" evenly throughout the individual components.

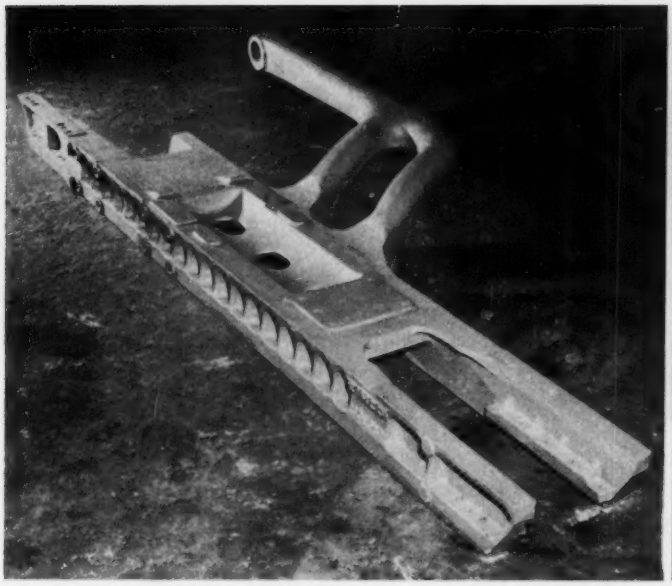
- **Fewer Parts**—One piece cast construction of major components gives the customer low maintenance by eliminating many bolts, covers, welds, threaded connections, and internally tapped holes. In manufacturing, advantages include ease of machining and assembly—factors which cut costs to give more value per pound and per dollar.

- **Skull Sessions**—Thinking on the new tractor line was kicked off more than a year ago at a symposium of Eimco design engineers and American Foundry & Machine Co. (Eimco subsidiary) foundry engineers. Typical topics: Designing for casting soundness, principles of molten metal solidification, structural weakness sources, elimination of casting hot spots, rules for optimum casting design.

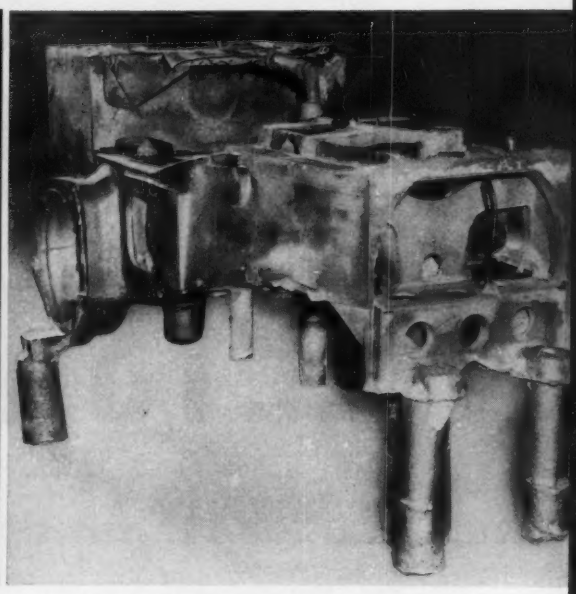
With designers familiar with casting methods and problems and with foundrymen brought up to date on the designers' needs, more castings



Wooden model of main frame casting was constructed for study by designers and foundry engineers



Track frame is combined with diagonal brace in this casting. Smooth flow of metal blends working portions, distributes stresses



Rough casting of main frame is the metal counterpart of wooden study model

were designed into Eimco's 103 tractor series. Properly designed steel castings were known to be serviceable in heavy equipment—many can be found, for example, in railway applications. And the reduction of multipiece assemblies reduced and simplified the problems of localized stress concentrations.

• **Smooth Curves**—Analysis of the design problem in the engineering department starts with the problem of how best to provide a combination of maximum strength and minimum stress. Using curves and flowing lines in joining sections, most straight lines and sharp angles can be eliminated.

The designer must also have a knowledge of stress analysis. He must measure or calculate how a dimensional change will affect the location and direction of stresses in service. And this again will modify part design.

With a proposed design to work

(*Please turn to Page* 160)

"In modern manufacturing, electrical control equipment is the very heart of mechanized and automatic operation. Because our plants have become so dependent on this equipment, the cost of 'down time' for any control failure is simply staggering. And, according to many manufacturing engineers, limit switches are the worst offenders, accounting for as much as 70% of all interruptions due to control failures."

Mr. J. S. Wilford, Editor
PRODUCTION Magazine

"At least 60% of the electrical failures causing downtime of the production machinery used in manufacturing home appliances at the Whirlpool Corporation can be traced to faulty limit switch operation. An analysis of the switch failures reveals the inability of limit switches to meet the requirements of high production equipment such as is widely used in our St. Joseph Division."

Mr. C. R. Burg, Maintenance Engineer,
Whirlpool Corporation

"75% of the electrical failures on our machines can be traced directly to limit switch malfunctions. This problem is particularly aggravating to us because we are responsible for the successful operation of our machines and their components on our customer's floor. We have spent a great deal of time engineering protective mounting schemes to compensate for the inability of today's limit switches to check the seepage of corrosive coolants and microscopic grit."

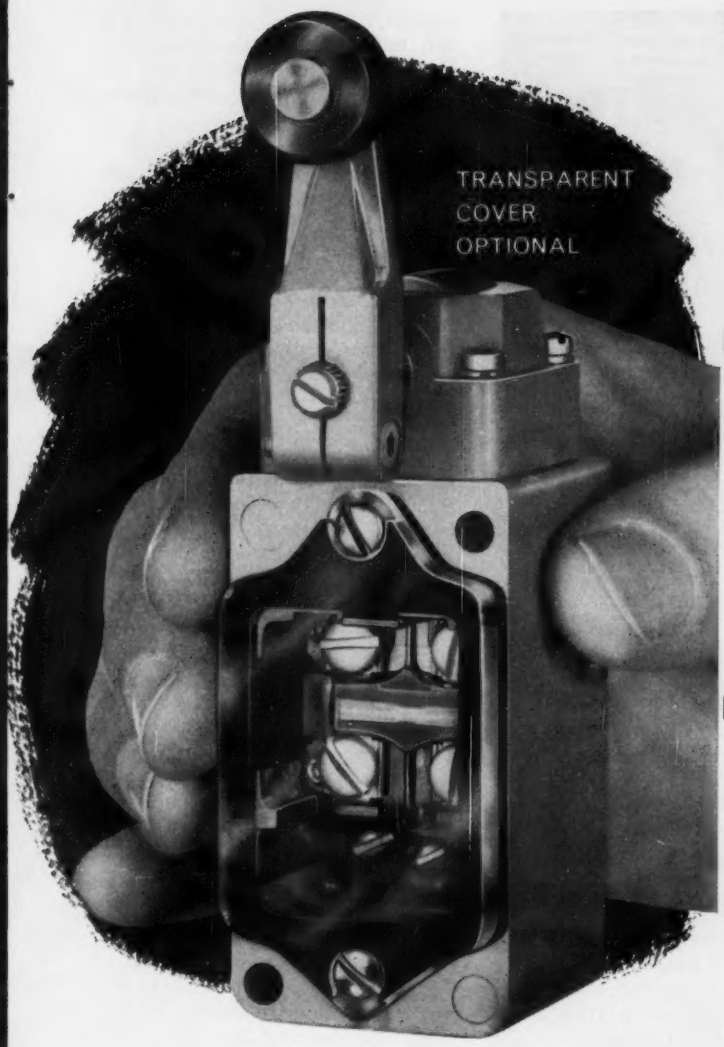
Mr. N. P. Bashor,
Director Electrical Division,
W. F. & John Barnes Company

Production's Enemy #1 MEETS ITS MASTER

Cutler-Hammer announces the *first*

- ***Tolerance Compensated***
- ***Contamination-proof***
- ***Visible Contact***

Extended Life Limit Switch



■ *Tolerance Compensation*

The new Cutler-Hammer Extended Life Limit Switch represents a startling break-through in high-precision manufacturing methods. Each sub-assembly is accurately calibrated so that in final assembly all plus and minus tolerances are precision balanced or compensated. Thus, tolerance compensation guarantees every C-H Extended Life Limit Switch will operate identically with precise repeat accuracy and ultra-long life. No binding . . . no sticking . . . no points of concentrated stress or wear.

■ *Contamination-proof*

New triple sealing positively checks seepage of all forms of oil, coolants, moisture, and abrasive grit. New cone-seal stops seepage through the operating shaft bearing. New vulcanized bellows-seal between the operating head and body eliminate the troublesome "O-ring" seal . . . won't wear . . . never needs attention. New cover seal seats on a raised lip . . . repeated opening and closing of the cover won't destroy the seal. Total-submersion life tests prove the new C-H Extended Life Limit Switch to be contamination-proof . . . suitable for even dry circuit applications.

■ *Visible Contacts*

Another Cutler-Hammer *first* . . . this new Cutler-Hammer Limit Switch provides completely enclosed but *visible* single pole double throw switch contacts. During installation, one glance shows which contacts are open and which are closed . . . no chance for wiring errors. During operations, one glance proves whether the switch is set and operating correctly. Positive visible inspection cuts maintenance costs too.

Compare these features, too!

- **One basic model is readily adapted to all desired forms of lever or plunger actuation . . . for either momentary or maintained contacts . . . for either surface or cavity mounting.**
- **Unsurpassed flexibility: 90° orientation of the operating head. 360° rotation of lever arm with a locking device that holds the adjustment. Lever operators provide clockwise, counter-clockwise, and clockwise-counter-clockwise actuation . . . easy to set on the job without disassembling the switch.**
- **Precise actuation . . . 10° pretravel—40° overtravel or 5° pretravel—45° overtravel.**
- **Visible, saddle-clamp terminals . . . no loose fibre flash-over barriers.**
- **Unitized switch mechanisms are interchangeable . . . speeds replacements when overload or short circuit damage occurs.**
- **Meets all JIC and NMTBA requirements. Easy, complete interchangeability with any widely used limit switch.**

The new Cutler-Hammer Extended Life Limit Switch installs easier, works better, and lasts longer than any of the "oil-tight" limit switches now in use. Exhaustive tests, including total-submersion life tests, confirm this fact! But don't take our word for it. Try it . . . Test it . . . Compare it. The new Cutler-Hammer Extended Life Limit Switch is completely interchangeable with any widely used limit switch. Replace your *most* troublesome limit switch installation with this new tolerance compensated, contamination-proof, visible contact Cutler-Hammer Limit Switch; and it will work better, last longer than any other you have ever used. This is the answer to your limit switch problems.

For descriptive data write for Publication **ED143-F213.** Cutler-Hammer, Inc., Milwaukee 1, Wisconsin.

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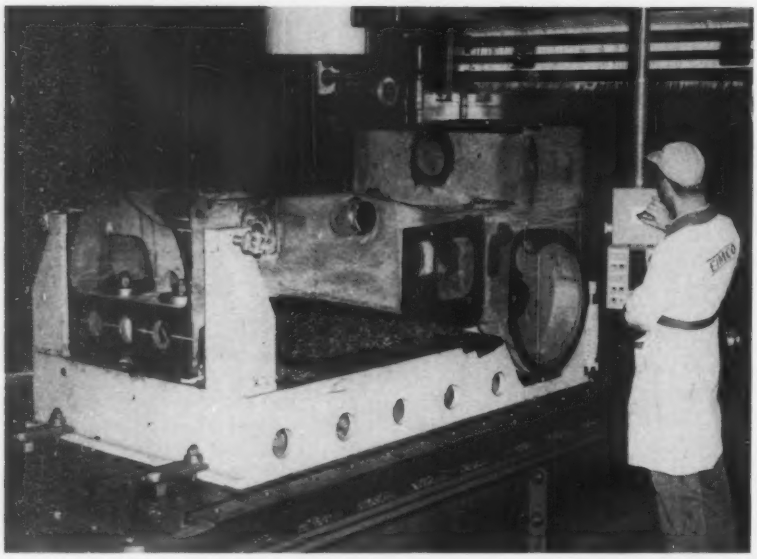


Machining of the main frame casting requires special fixtures, contributes to reduction of 375 lb from rough casting

(*Concluded from Page* 157)

with, the next step is to call in the foundrymen. Other questions must be asked. Is it practical to cast the part as designed? Can a suitable metal flow pattern be worked out? And heat treatment, cleaning, and machining must be considered.

More design changes are usually involved before the combined requirements can be met.

For large castings, scale models are made and examined to eliminate hot spots and to plan on feeding and gating the complex structure so that proper information can be furnished to the patternmaker. When such castings are being produced, costs don't permit making a series of samples while studying optimum design. But plaster casts can be used to check the entire casting, or parts of some large units.

• **Pattern Next**—Now the pattern shop takes over, and another advantage of the casting process becomes apparent. When rounding corners in a metal part, machining operations such as chamfering are required. But on the pattern, all that's needed is a simple template and some sandpaper. Exceptions needing special planning: Sharp corners formed at partings and the area where cores leave a casting cavity. But if such things are specified before the pattern is made, the problems can be resolved; costs mount when changes are made after pattern construction.

• **More than One Grade**—For general purposes, Eimco classifies its steel castings into three strength levels. Use depends on the kind of part being produced. For tensile strengths in the range of 60,000 to 80,000 psi, an annealed carbon cast steel is used. It will have a minimum yield strength of 50,000 psi and a Brinell hardness of 165 to 185. Applications of the grade include rigid frameworks, housings, and rolling parts which are not power transmitting.

The next strength level is 130,000 to 160,000 psi, obtained by the use of normalized alloy steel castings. This grade is required for wheels, pinions, shafts, and other parts. And for higher strengths, a heat treated alloy steel is employed. It is used for gears, track shoes, sprockets, idlers, track rollers, and other high power transmitting parts requiring both fatigue strength and wear resistance. Tensile strength ranges from 160,000 to 200,000 psi.

Regardless of the alloy, says Eimco, close metallurgical controls are required in analysis and operations to assure the optimum strength values. But the results are worth the effort: Parts with close tolerances on critical dimensions are cast in production quantities; machining is at a minimum; and reliable higher strength permits lower weights, lower costs.

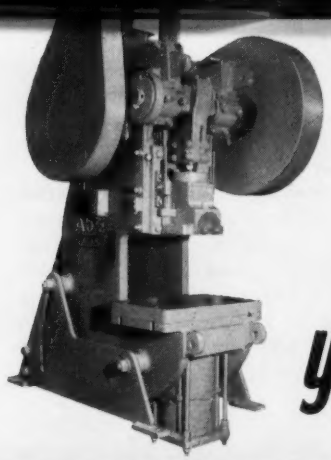
• **Main Frame**—An intricate, high strength steel casting is used as the main frame of the 103 series tractor. The single casting, the "core" around which the unit is built, weighs 3325 lb as cast, 2950 lb as finished, and serves many purposes. It forms or supports the center engine supporting frame, the opposed final drives, the spacer frame, the rear center cavity hydraulic reservoir (used on both the front end loader and the hydraulic bulldozer versions), totally enclosed steel cavities for the disc brakes, and also allows for a new pump drive arrangement.

Prior to the making of the pattern and coreboxes for the main frame casting, the wooden model (see photo, Page 157) was constructed. Designers and foundrymen modified the original version. Finally, the first rough casting was produced and machined for starting assembly of the tractor.

The track frame and diagonal brace assembly are combined in a single casting. "Stress Flow" thinking resulted in a smooth flow of metal from the track frame portion of the casting to the diagonal brace, cutting total metal requirements and at the same time distributing stresses. Since the diagonal brace is also a structural portion of the track frame, a corresponding amount of metal could be eliminated.

• **Hundred Horses**—The 103 series tractor is powered by a 100 hp diesel engine, driving a heavy duty torque converter and four speed power shift transmission. Tracks are powered by dual final drives which are independently reversible. The four speeds provide a range of 2 to 6½ mph forward or reverse. The same basic unit is used for a tractor-bulldozer, a front end loader and fork lift, a steel mill front end loader, and a log loader.

• $1000 can be yours in STEEL's Usership contest. Read the Servicenter, Pages 5 and 6.



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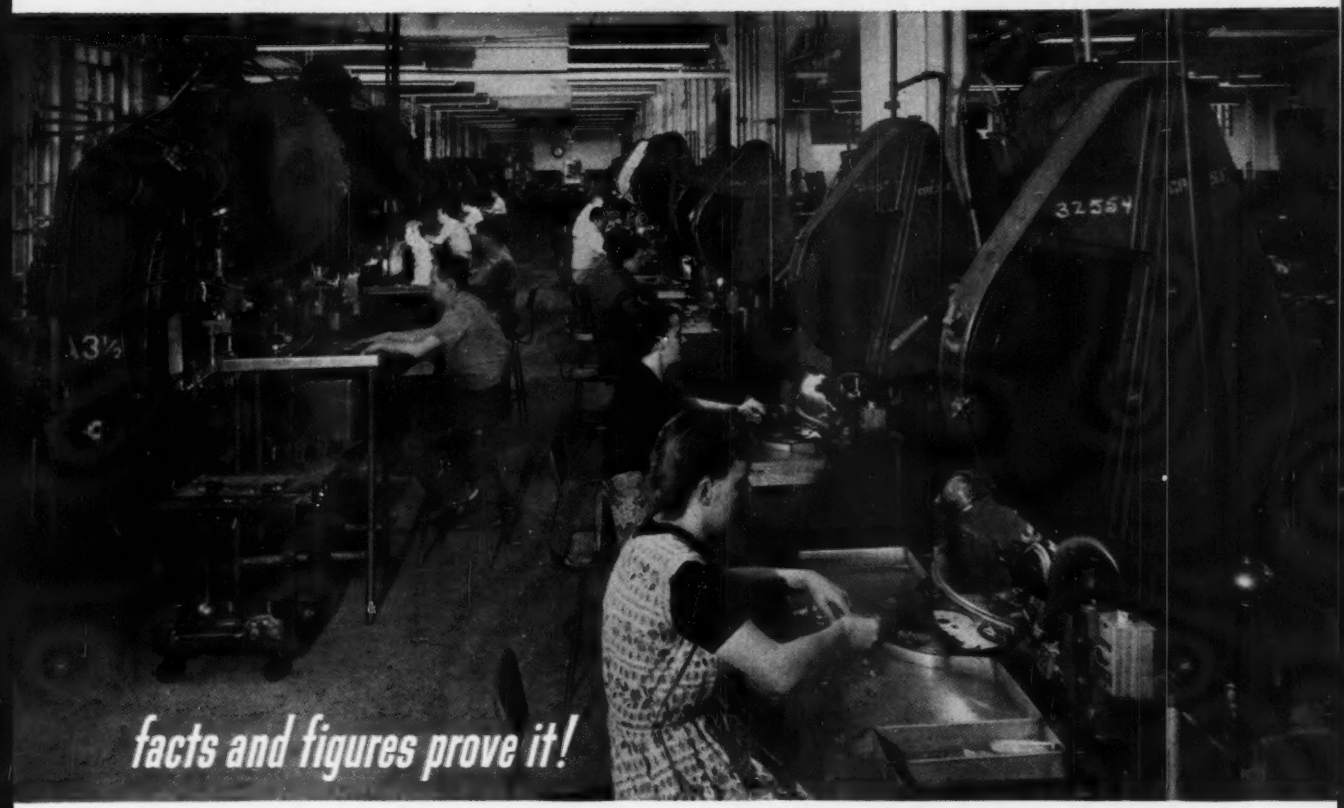

Cold, hard statistics leave no doubt. Wherever performance data and cost records are compared, the Series A Inclinable is way out front in parts produced per dollar expended.

On the most demanding jobs . . . where the clutch is engaged and disengaged at every press stroke . . . where three-shift operation continues day after day . . . *no OBI can even approach it in thrifty operation, fool-proof simplicity, and safety.* Readily understandable are the reasons why:

Niagara's famed, multi-point mechanical sleeve clutch picks up the load on 14 engaging jaws, applying the driving force concentrically without keys or pins. Instant engagement and maximum productive strokes per minute are assured.

There are no complicated electrical circuits, relays, limit switches or solenoids . . . no palm buttons, air valves or rotary air connections. In fact no air is consumed.

With fewer parts and simpler construction, there's less to go wrong, less to repair or replace. As a result, this is not only a more economical press to operate, but a much safer press as well. Records of thousands of presses are factual proof that the Niagara mechanical sleeve clutch is unequaled in safety and reliability.

Built in 13 standard sizes, with shaft diameters from 1¼" to 6½" and capacities from 5½ to 190 tons, Niagara Series A Presses can be readily equipped with numerous accessories for individual requirements.

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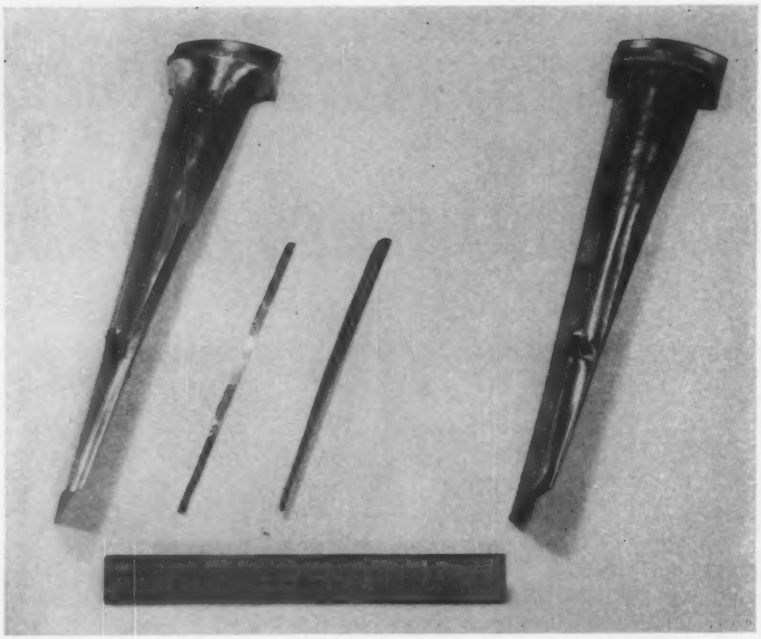


Stellite insert (center, with filler material) is brazed into the milled slot on the turbine blade shown at left. Finished workpiece is shown at right

Automatic Machine Reduces Brazing Time by 60%

TWO automatic machines have replaced manual brazing of turbine blades at Westinghouse Electric Corp.'s Lester, Pa., plant. Brazing time has been reduced 60 per cent, says the company.

The machines, built by Selas Corp. of America, Dresher, Pa., braze Stellite strips to the leading edge of low pressure steam turbine blades in less than 2 minutes. One machine brazes righthand blades, the other handles lefthand blades.

• **Procedure**—The blade is cleaned with a dry sandblast and mounted on a fixture in the machine. A Stellite strip and brazing alloy are then fitted in a milled slot running along the leading edge. Two toggle clamps and a series of air operated clamps hold the strip firmly in place.

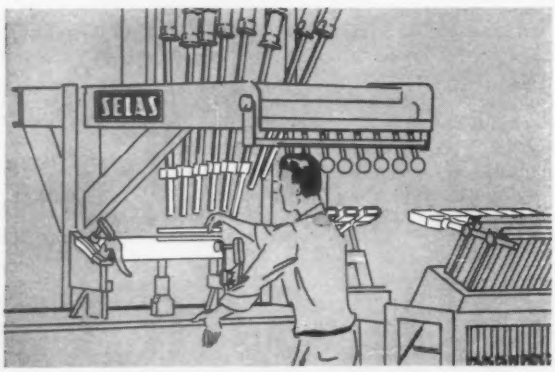
The cycle starts with the push of a button. The fixture moves along the machine into position between two manifold burners. Each manifold advances toward the blade, directing a high fire along the leading edge.

• **Heat Leads to Speed**—The burners are like miniature refractory lined furnaces which release heat at temperatures of about 3000° F and gas velocities up to 2500 fps. The fast brazing time is the result of high heat released at high velocities, enabling the burned gases to cut through "dead" air films around the blades.

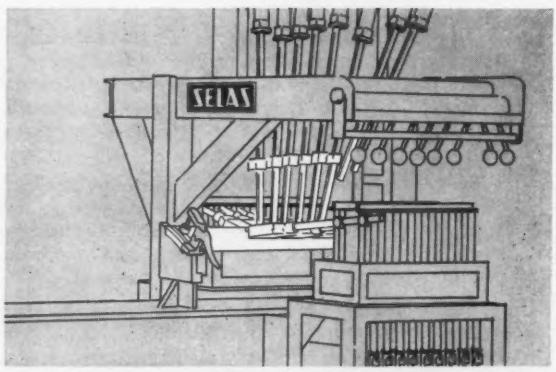
On completion of the preset brazing cycle, the manifolds are automatically retracted and the cart moves back to the loading station.

In manual brazing, the Stellite inserts were placed on the surface of the blade with sufficient fillet to grind a smooth contour. With the new units, only a minimum of filler material is needed to assure a good joint, claims Westinghouse.

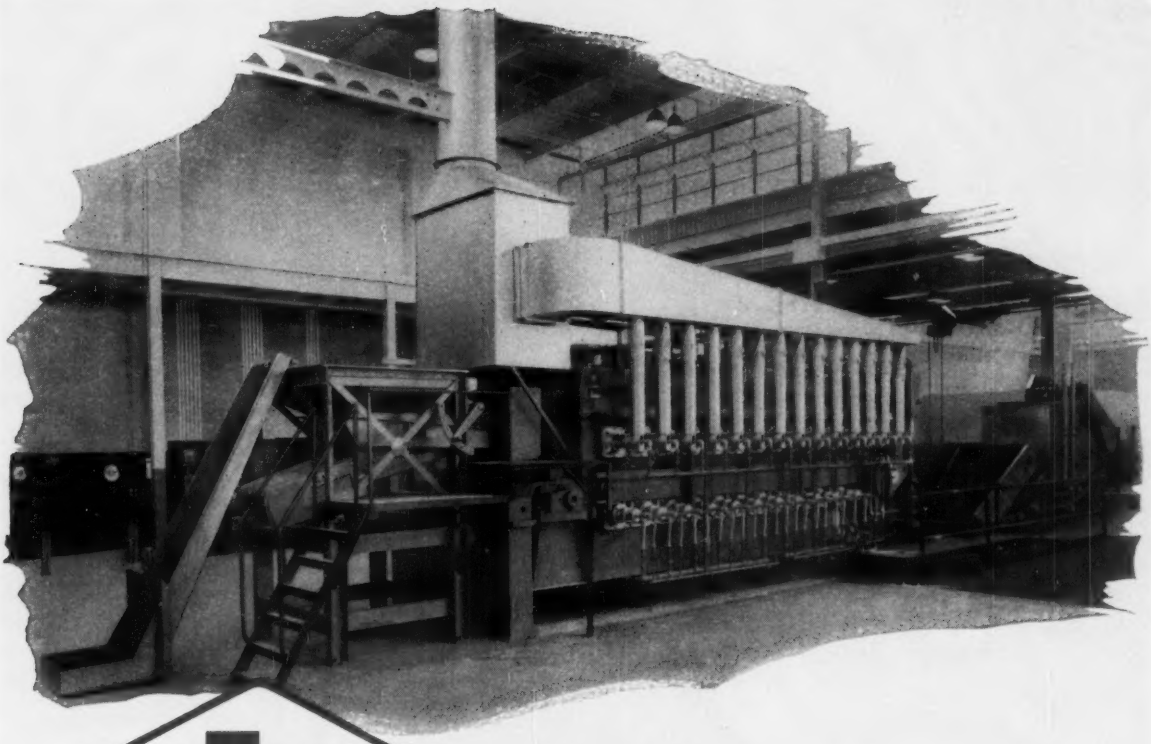
The Stellite inserts are used to prolong blade life. In the low pressure section of the turbine, droplets of water are present and are highly erosive at high linear speeds.



Operator fits Stellite strip and brazing alloy in milled recess of blade. Fixture cart is in loading position



Push of button automatically moves cart forward to position between burners for heating cycle



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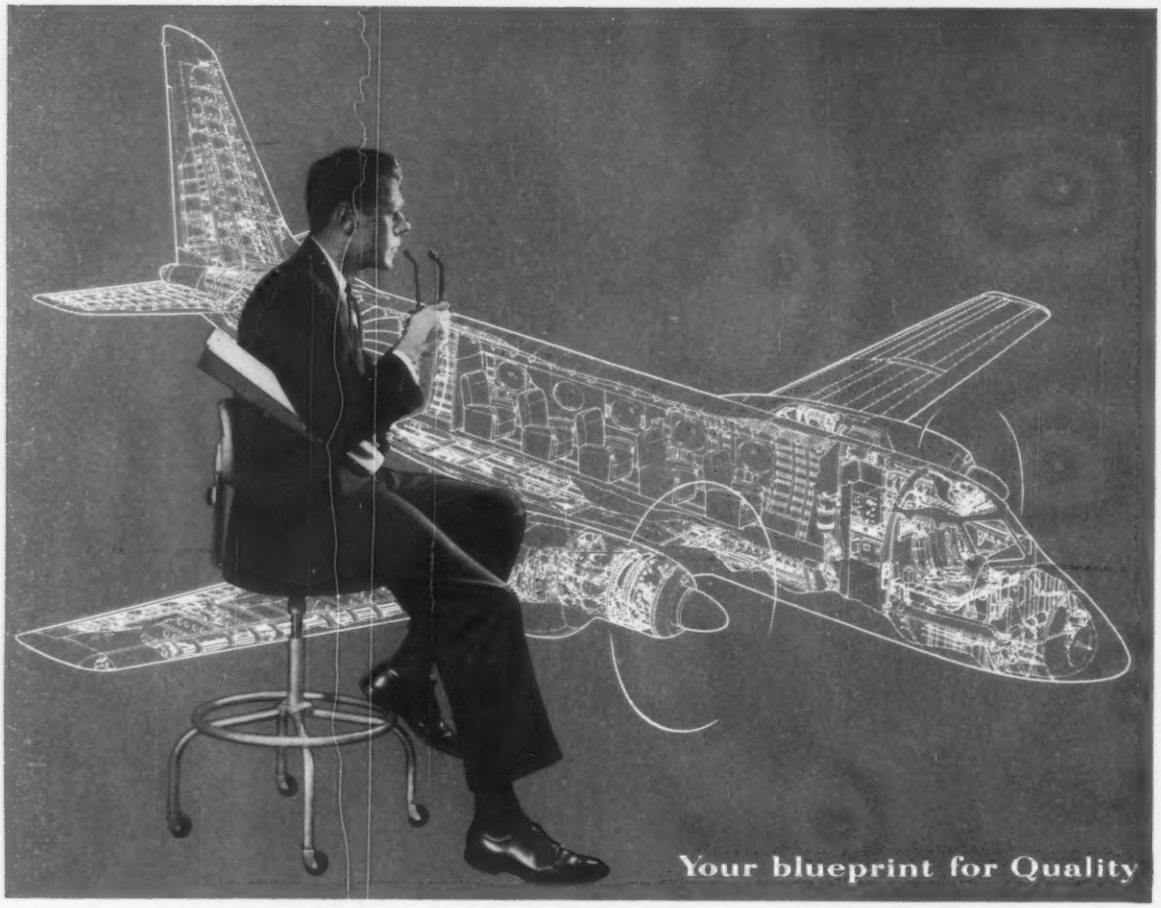


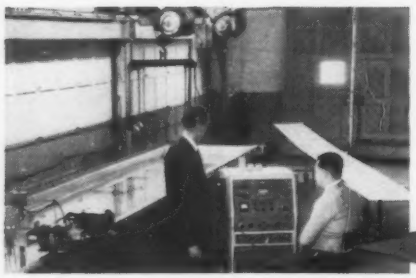
The Man is Sperry Ultrasonics

For years he has collaborated with Grumman's Quality Control Group and engineering personnel in developing ultrasonic test methods and techniques to assure the structural integrity of the material used in carrier-based aircraft.

These nondestructive flaw detection techniques, developed for structures required to withstand rigors of in-fleet service, are now applied to Grumman's new business airplane, the Gulfstream..... "built to withstand fatigue for the equivalent of more than fifty years of operation."

Sperry sales engineers are recognized authorities on the application of ultrasonic techniques in nondestructive testing. They are the link that sparks Sperry research and development teams to create the tools to meet your quality control requirements.

When there is a quality control problem, call the man who is Sperry Ultrasonics.



Quality Control Group inspects Gulfstream wingplank section in Grumman Sonic Laboratory.

Sperry Products Company

DIVISION OF HOWE SOUND COMPANY

903 SHELTER ROCK ROAD, DANBURY, CONNECTICUT

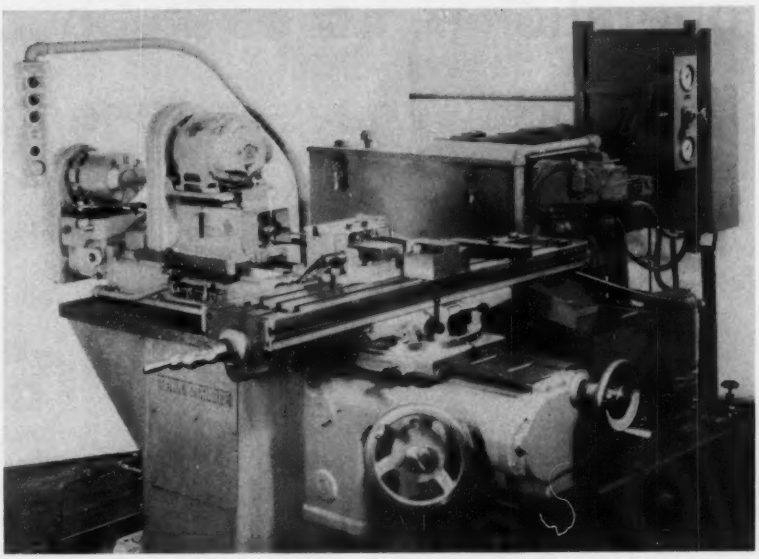
Deep Hole Drilling Unit Simplifies Setup

YOU GET flexibility, simplicity of setup, and economical production of drilled parts with the Brown & Sharpe deep hole drilling machine. The unit has knee type construction and eliminates the need for fixtures normally required for hole location.

Capacities range from 1/8 to 1 in. with a 12 or 24 in. feed stroke. Spindle speeds and feed rates are suitable for a wide work range. The unit has a 28 in. longitudinal travel, and 12 in. of transverse and vertical travel. A zero setting gage locates the table and workholding device in relation to the drill spindle axis.

A high pressure coolant unit delivers up to 30 gpm at pressures up to 2000 psi. It has a filtering capability of 5 to 10 microns.

Optional equipment includes a step pulley for three spindle speeds, a variable speed drive for infinitely variable spindle speeds, and power travel in all directions. Special fixturing and accessories are available for long run applications.



For further information, *write* Machine Tool Div., Brown & Sharpe Mfg. Co., 250 Promenade St., Providence 1, R. I.

Multiple Die Press Is Made in Two Sizes

ARE YOU looking for a piece of equipment that can turn out screw caps, tape cans, shoe polish cans, and other products of that type in large quantities?

This Bliss multiple die press is designed for such jobs.

It can produce eight, ten, or even more items at each strike.

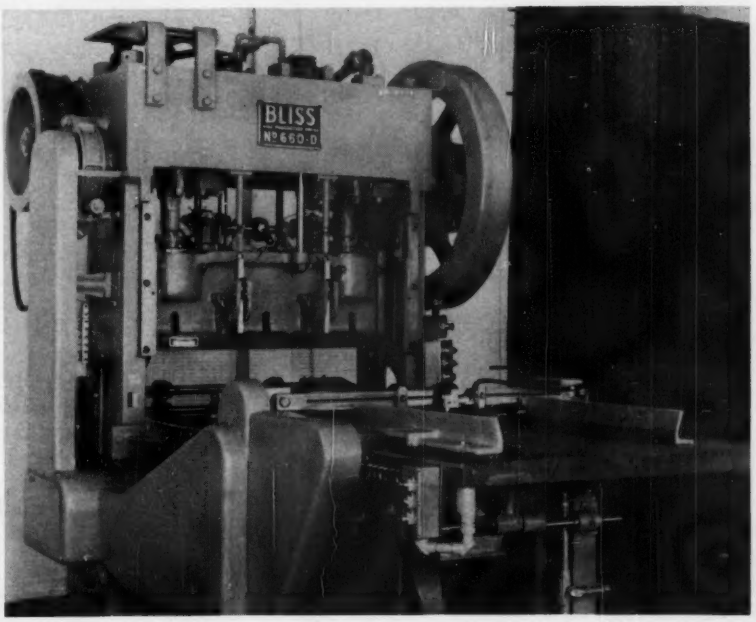
Operating speeds of this press range from 100 to 125 stroke per minute.

Model 660-D (shown) can turn out eight 48 or 53 mm caps at each stroke.

A larger model (6100B) produces ten 70 mm caps per stroke or a smaller number of larger size caps. The unit can handle lithographed sheets of tin plate or aluminum.

For further information, *write* E. W. Bliss Co., 1375 Raff Rd. S. W., Canton 10, Ohio.

(*Please turn to Page* 168)



"Now, thanks to Columbia-Southern's recommendations, our Trichlor degreasing operation removes stubborn soldering flux, and we have reduced our maintenance costs"

reports Thomas F. McDonough,
Superintendent,
American Meter Company, Inc.,
Philadelphia

Thomas McDonough (right), Superintendent of the American Meter Philadelphia plant, discusses improved degreasing results with Edward Losben, of Globe Solvents.

"We run a fast degreasing cycle, passing soldered gas meters through an electrostatic painting system. So even brief stops caused by faulty degreasing cost us real money. That's why we are so pleased with Columbia-Southern's assistance."

Mr. McDonough speaks with authority. American Meter's Philadelphia plant turns out a giant's share of the nation's gas meters. Every work station in the complicated assembly operation is carefully engineered for efficient production. And frequent inspection stops along the way insure leak-proof meters that give years and years of accurate gas measurement.

This precision and concern for quality is evident in the degreasing set-up, too. American Meter degreases and paints fully assembled gas meters in a continuous, integrated operation. Meter housings consist of two metal shells soldered together. Painting is done electrostatically, to provide an even coat rapidly. Before painting, the meters pass through a large-capacity vapor degreasing machine, with Trichlor used as a solvent. This action removes excess soldering flux—an acid-type material that makes paint peel. The Trichlor treatment also removes grease and soil picked up during handling. End result is a perfectly clean surface that takes—and holds—an even coat of paint. And since some American Meter units are used outdoors, in all types of climates, the paint job must have a long life.

American Meter *has* to get excellent degreasing results. With their fast-moving production cycle, poor handling for even the briefest period of time would lead to a costly number of rejects. Also, because they paint electrostatically, the painting surface must be completely free of all foreign matter, to take the coating ejected during the rapid pass through the paint machine.

To get the most efficient vapor degreasing possible, American Meter called on Columbia-Southern's Technical Service Department. A Columbia-Southern Technical Service Engineer, working with the Columbia-Southern distributor, Globe Solvents Company, Inc., of Philadelphia, inspected the operation and recommended a more careful maintenance program. They found that American Meter had been running solvent with too high an acid concentration from removed flux. This harsh solution harmed the lining of the degreasing machine itself, and pitted the gas meter housings.

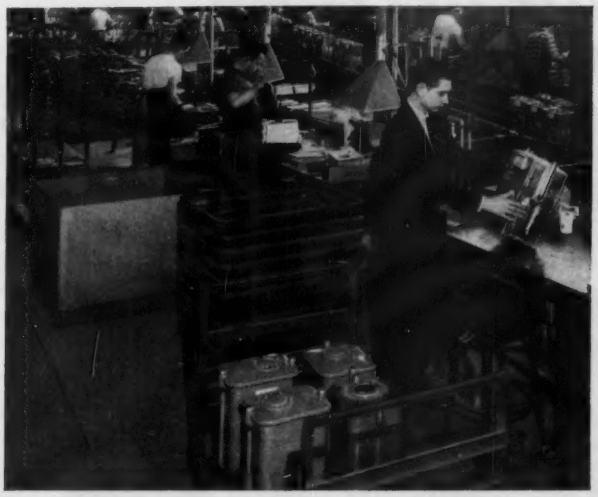
By following Columbia-Southern's advice, American Meter was able to determine the ideal stopping point for cleaning, before passing harmful solvent back into the cycle. This has eliminated the trouble, and American Meter now gets a cleaner meter for painting, and spends less time and cost on degreasing maintenance.

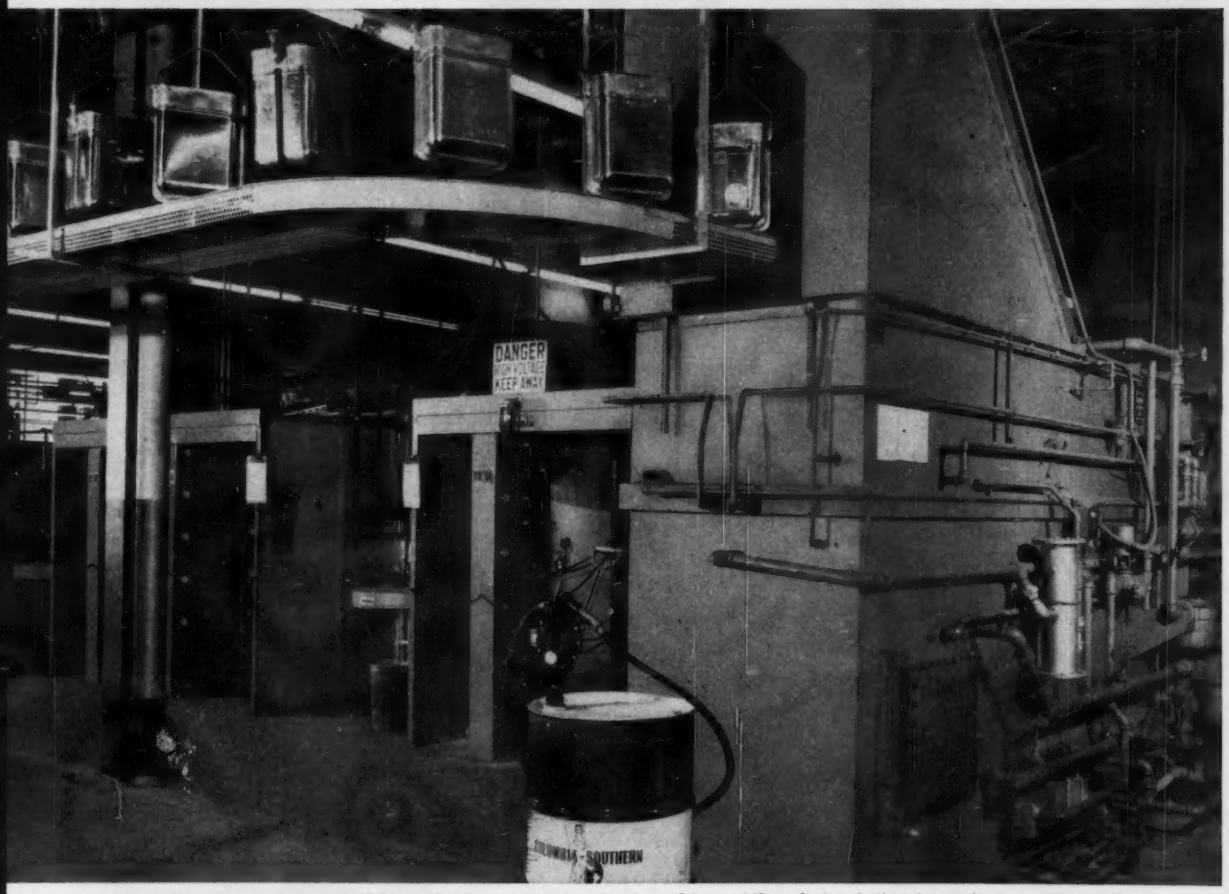
This help from Columbia-Southern's Technical Service Department, combined with excellent service given by Globe Solvents, explains why American Meter is sold on Columbia-Southern Trichlor.

You'll like doing business with Columbia-Southern

American Meter produces gas meters for every need—from small private homes to large hotels and apartment houses.

Harvey Plowfield (in dark suit), American Meter's Standards Engineer, inspects newly soldered gas meter housing at one of plant's assembly lines.





American Meter degreases up to 1,200 completely assembled meters in an 8-hour shift—a fast cycle that demands top quality results.

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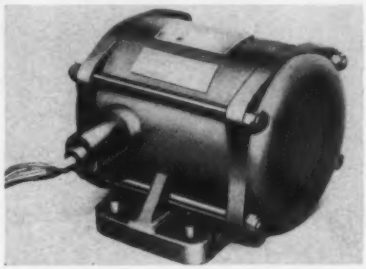
BITUMINOUS COALS FOR EVERY PURPOSE

NEW PRODUCTS and equipment

(*Continued from Page* 165)

Electric Vibrator Moves Stubborn Materials

YOU can move stubborn materials through bins, chutes, and hoppers with the RC-32 totally enclosed vibrator. It's listed by Underwriters' Laboratories for Class I, Group D conditions (includes atmospheres with natural gas, gasoline, naphtha, and similar vapors).



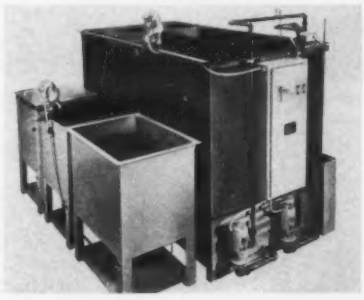
The unit delivers 3600 vibrations a minute on 60 cycle current. Vibration force is produced by eccentric weights fastened on each end of the rotating motorshaft. Vibration impact can be adjusted from 385 to 1100 lb.

For further information, *write* Cleveland Vibrator Co., 2827 Clinton Ave., Cleveland 13, Ohio.

Packaged Disposal Unit Treats Chromium Wastes

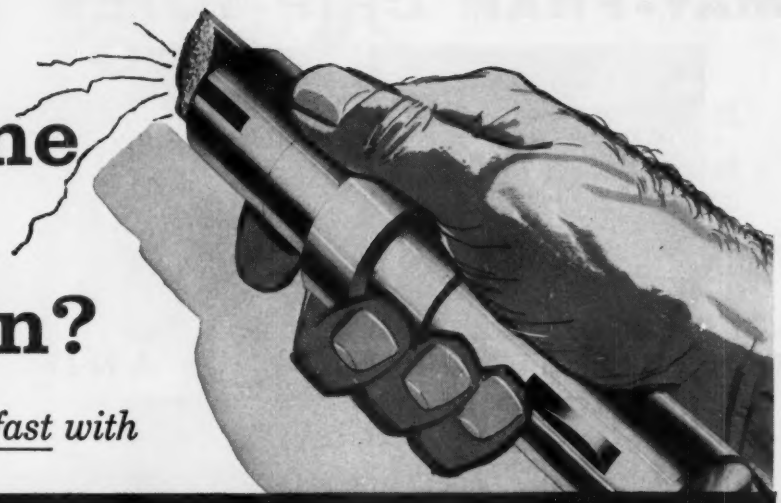
UP TO 600 gallons of chromium wastes per hour can be treated by the Model 3340 packaged waste disposal unit. It collects chromium rinse water in a sump and then pumps this into a mixing, reaction, and settling tank that has eight compartments.

The unit is easily installed and requires no change in floors, drains,



Machine part broken?

...make a new one fast with



LaSalle all-purpose STRESSPROOF STEEL BARS ...for maintenance

A broken machine part? You can cut your down-time from days to hours by machining your own replacement parts from LaSalle all-purpose STRESSPROOF. There's no need to wait for a new part to be shipped from the factory...or to put up with the delays of heat treating and secondary operations.

Here's why STRESSPROOF *will help you get back into production faster (and minimize future breakdown possibilities):*

- STRESSPROOF needs no heat treating. *Now available in sizes up to 4" rounds.*
- It machines faster . . . rated at 83% of B1112.
- It's strong . . . 100,000 psi.
- It wears better.
- It costs less than heat treated in-the-bar alloys . . . and you can make most of your parts from just one stock of all-purpose STRESSPROOF.

STRESSPROOF IS AVAILABLE FROM YOUR STEEL SERVICE CENTER

24-Page booklet tells complete story of all-purpose STRESSPROOF

Use this coupon to request your copy of "How to make your own machine and repair parts quicker and easier." It tells how to make parts like these easier and faster: *arbors • axles • bolts • bushings • fasteners • gears • spindles • shafts • studs, etc.*

LaSalle STEEL CO. 1414 150th Street Hammond, Indiana

Name_____

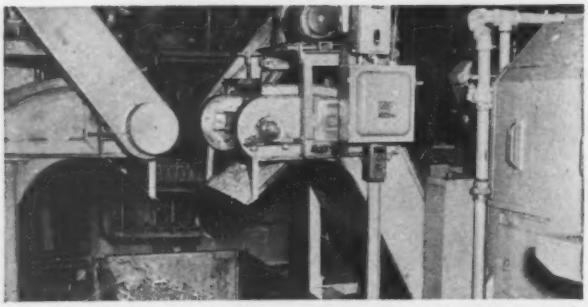
Title_____

Company_____

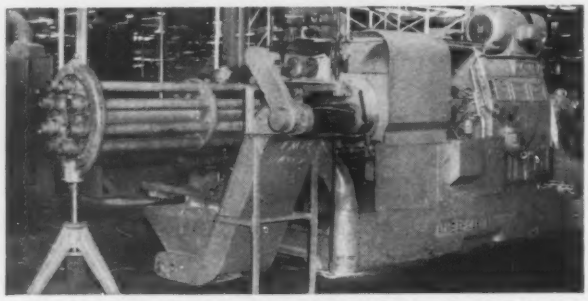
Address_____

City_____ Zone___ State_____

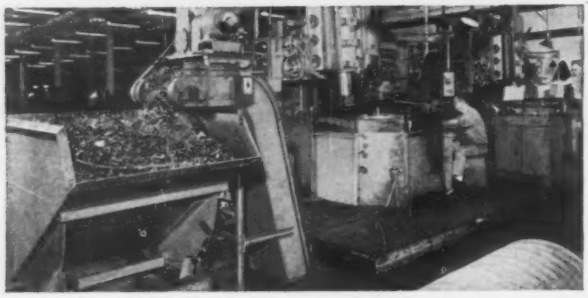
MAY-FRAN CHIP-TOTES



PROVIDE AUTOMATIC AND

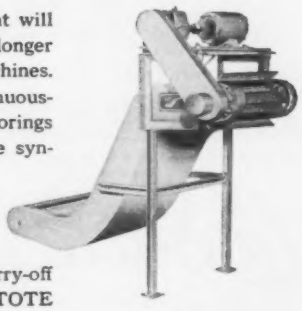


CONTINUOUS SCRAP REMOVAL



FROM ALMOST EVERY TYPE AND SIZE OF MACHINE TOOL

Here is a machine tool accessory that will cut production costs, and permit longer "run" times for your automatic machines. The MAY-FRAN CHIP-TOTE continuously removes the chips, turnings and borings from machines. The conveyor can be synchronized with the metal removing capacity of the machine. Scrap is channeled onto the CHIP-TOTE belt, carried clear of the machine for discharge into tote box or carry-off conveyor system. There is a CHIP-TOTE for every machine tool.



MAY-FRAN ENGINEERING, INC.

For complete facts, write today and ask for MF-640.

7548-MF 1725 Clarkstone Road • Cleveland 12, Ohio

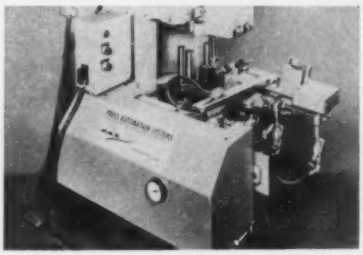
NEW PRODUCTS and equipment

or other structures. Motors, pumps, and controls are prewired. They operate on 220/440, three phase power. Operation is automatic and continuous.

For further information, *write* George L. Nankervis Co., 15300 Fullerton Ave., Detroit 27, Mich.

Packaged Feeder Unit Speeds Parts into Dies

PARTS can be fed into dies at rates from 40 to 60 pieces per minute. The PAS-IT feeder, which operates at those speeds, is air powered. It mounts on the side of an OBI press and transfers parts to the die from an operator fed, preload station out of die area. Parts are removed from the die by air ejection or other methods.



The unit has an arm that travels back and forth to pick up parts from the preload station and places them in the die. Part pickup can be done with vacuum lift, electromagnets, or gripper fingers. A safety interlock system is part of the unit.

For further information, *write* Press Automation Systems Inc., 25418 Ryan Rd., Warren, Mich.

Automatic Transfer Press Economical for Short Runs

A 25 TON automatic transfer molding press (Model 725) has been designed for short production runs where low mold costs and quick setups are needed. The press can be easily converted from transfer to compression molding.

The unit operates with direct powder feed by means of an easily adjustable, three station rotary feeder. A shop air supply with a

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because no other metal will do the job as well—

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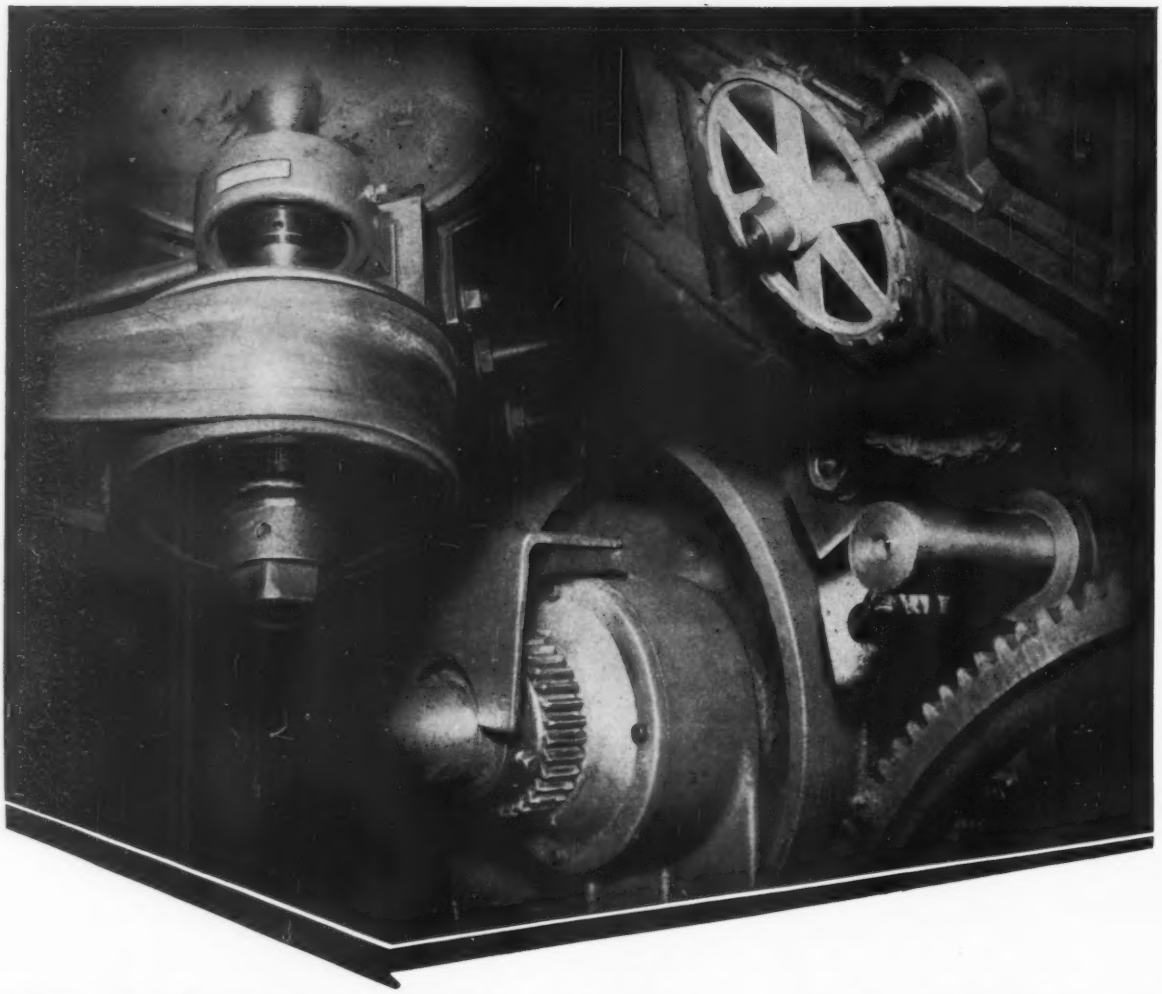

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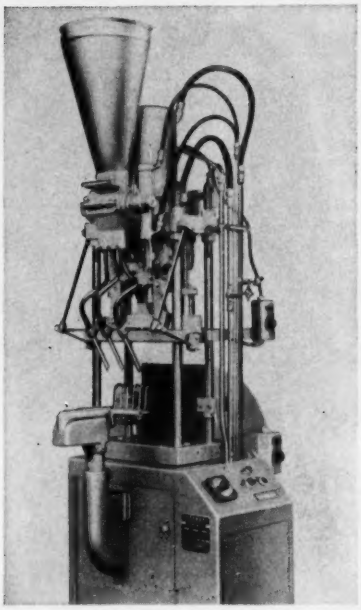


working pressure of 100 psi is required for press operation.

The unit is supplied with top and bottom ejection systems and has an air operated, blowoff device to clear the ejected pieces from the molding area. The molding cycle is controlled by the Stokes bar controller. That facilitates setup and expedites repeat setups. The press is completely protected so that the mold cannot be closed unless the moving members are free of the molding area.

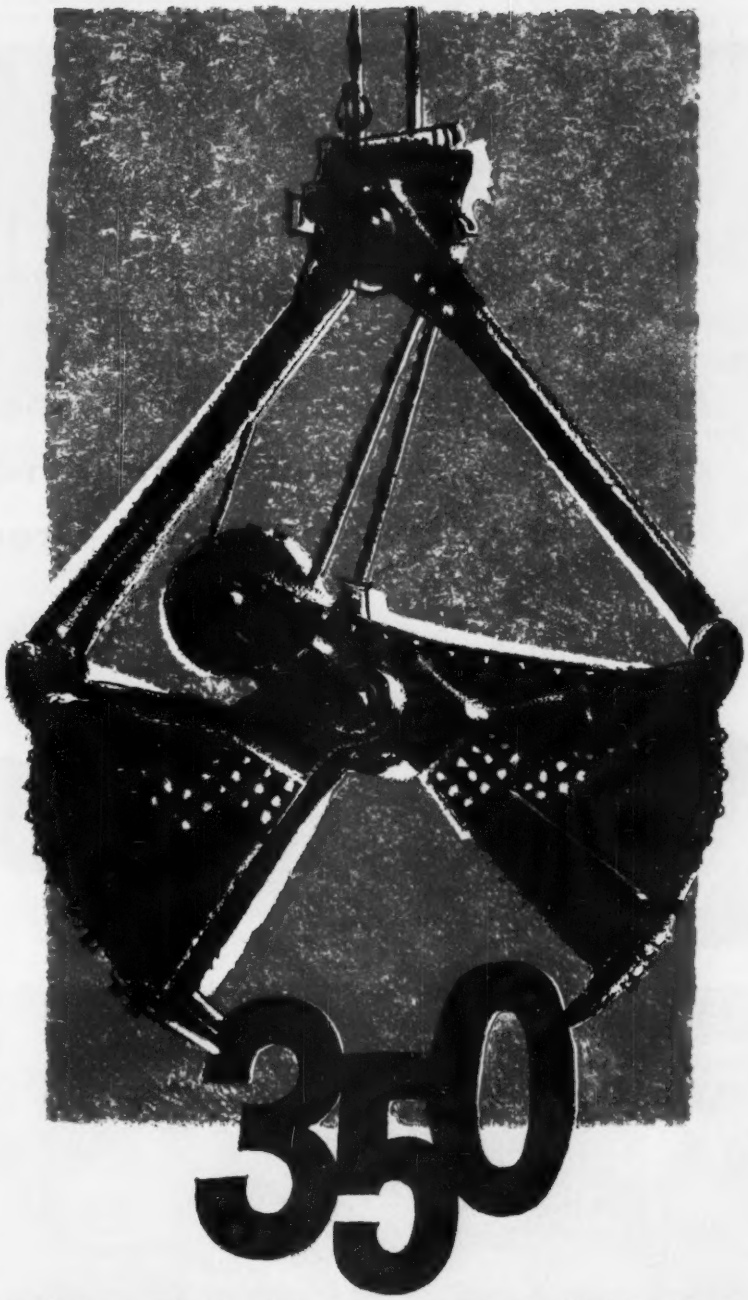
For further information, *write* F. J. Stokes Corp., 5500 Tabor Rd., Philadelphia 20, Pa.

Lightweight Winch Has 1000 lb Capacity

PULLING, lifting, lowering, and positioning 1000 lb loads can be done with the Cadillac base winch. Ratcheting the handle rotates the drum to take up or pay out up to 40 ft of 5/32 in., preformed, galvanized, aircraft cable or 20 ft of 3/16 in. cable. Stainless steel or nylon cables are optional.

The unit is mountable in any position and has positive load control. Prelubricated porous bronze bearings and stainless steel shafts

(*Please turn to Page* 176)



sizes and types make this the most complete line of Clamshell Buckets anywhere. Write for free illustrated catalog. Blaw-Knox Equipment Division, Pittsburgh 38, Pa.

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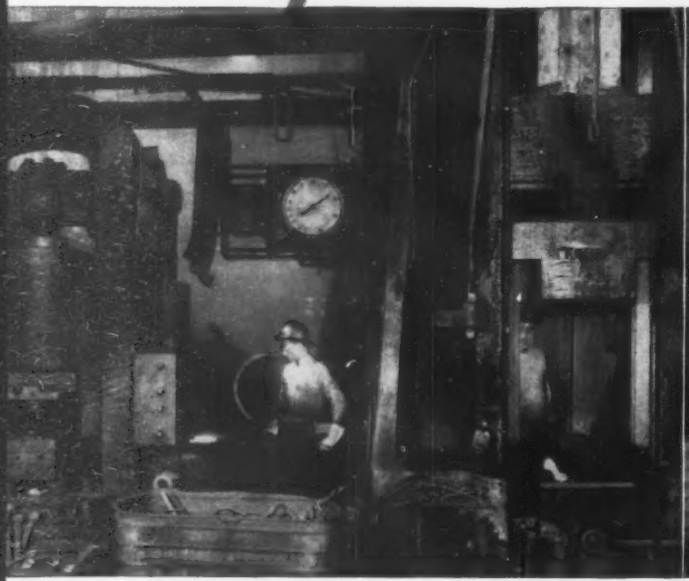
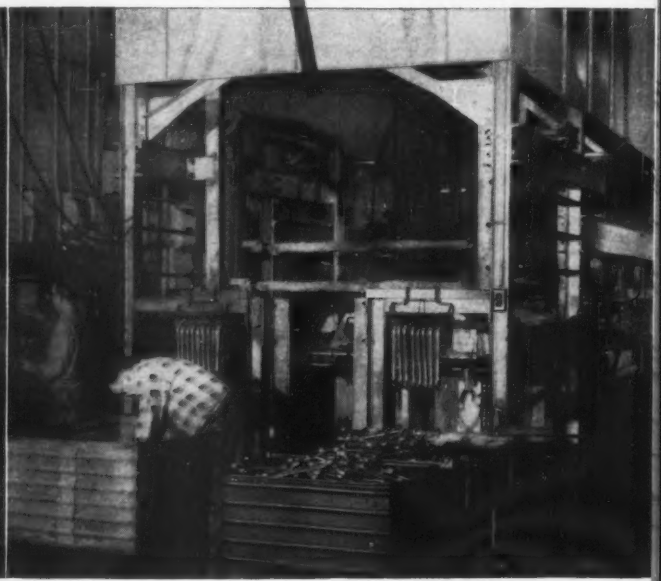
Clamshell Buckets

It's a Push-Button World at Williams

No other manufacturer has the combination of automated equipment to make the finest fit, feel and finish in wrenches!





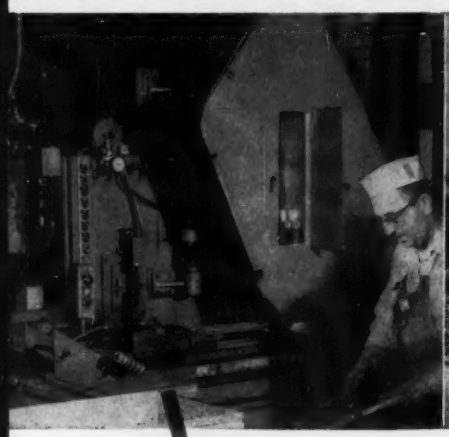
Forging temperatures for each of Williams' 65 hammers are automatically controlled by sensitive pyrometric instruments which comply with rigid aircraft specifications, MIL-Q-5923C(USAF). The result is tough, fine-grain forgings every time. Die matching is held to close tolerances for maximum structural uniformity.

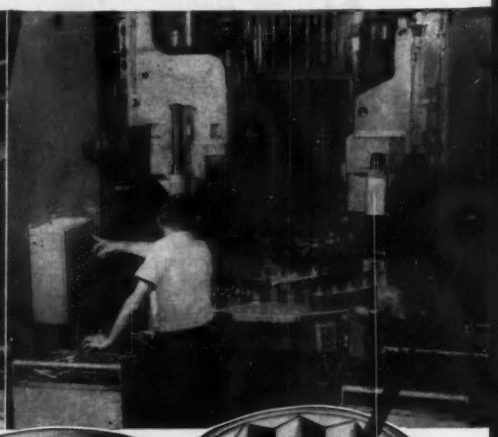
Special conveyorized heat-treating equipment automatically heats and quenches forgings in a series of salt baths to prevent decarburization and dimensional distortion often found in other wrenches. It further develops the relationship of toughness and hardness to the optimum.

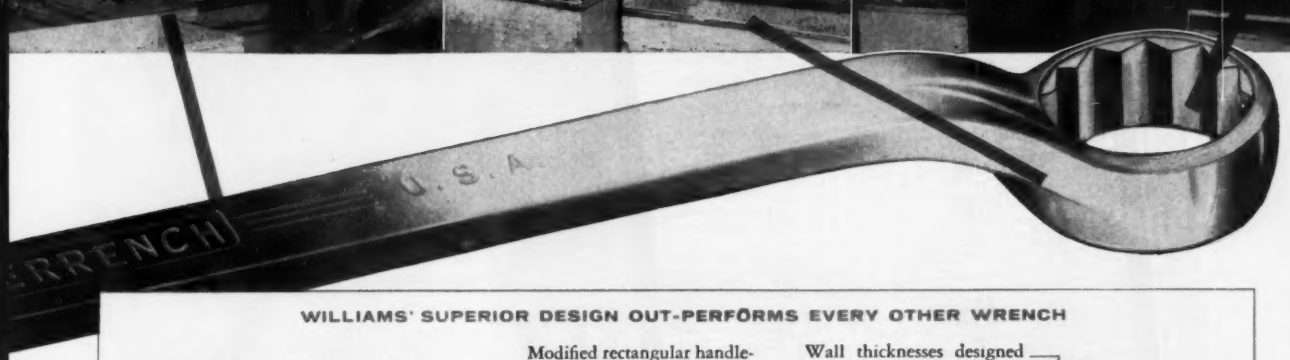
Feel and finish are refined on this automatic profiling machine. All rough edges are completely removed. Wrench handles are profiled to uniform dimensions and are blended into the heads for greatest strength.

Here wall thicknesses are machine-controlled to exact concentricities. This extra step produces heads offering uniform clearances from wrench to wrench... pattern to pattern.

Developed specially for Williams, this three station transfer machine drills, broaches and chamfers. Box openings are machined to tolerances well within industry standards for long-lasting, sure-grip fit.







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12 Point openings, broached to close tolerances, permit complete nut rotation in 30°

Modified rectangular handle-design offers maximum strength and comfort.

Wall thicknesses designed for maximum strength with greatest clearance.

Satin finish for safe, firm grip. No dirt-catching ornamentation.

Height of box wall correctly proportioned for all nut sizes and series.

Offset forged-in from top of box for the maximum obstruction clearance.

Williams Wrenches measure longer than industry average for extra leverage

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TOOLS OF INDUSTRY

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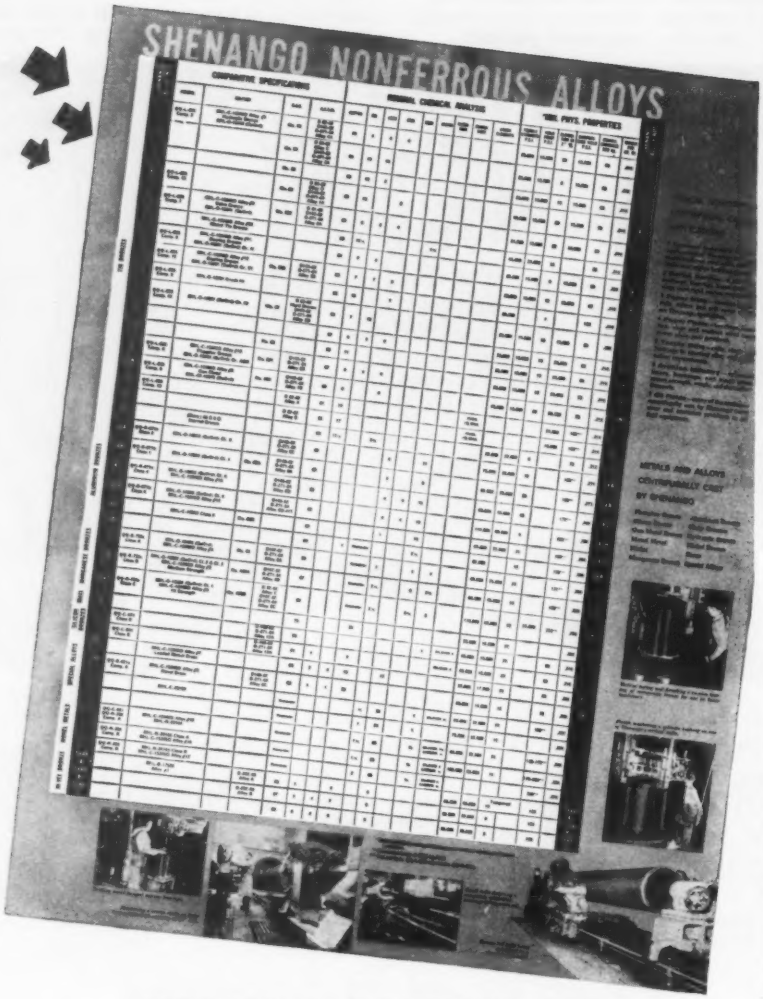

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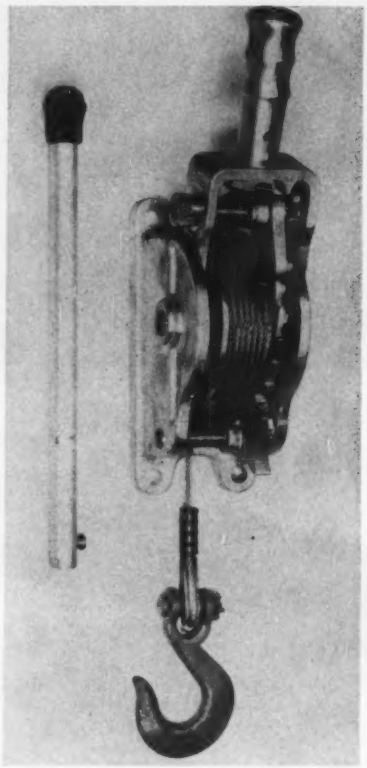
NEW PRODUCTS and equipment

(*Concluded from Page* 173)



and springs are used. With an easily changed cable and removable clevis slip hook, weight is 7½ lb.

For further information, *write* Aluminum Products Inc., Box 1462, Ft. Lauderdale, Fla.

Tig Welder Has Five Overlapping Ranges

PERFECT balance throughout the welding range (even during crater elimination) is claimed for the Model BWC-300MAP Tig welder. The unit also has arc stability without high frequency at amperage as low as 18.

The dc component normally encountered when joining aluminum has been completely removed by a new concept in balanced wave circuits. Arc-outs are eliminated. A voltage reducer automatically lowers open circuit voltage when an arc is struck or broken. This will operate even after a partial failure occurs in the voltage reducer circuit.

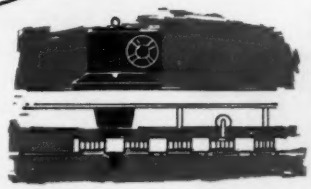
The unit has five separate weld-

(*Please turn to Page* 181)

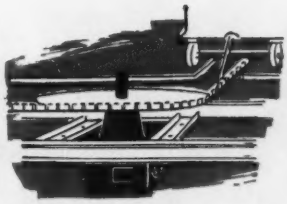
FAST off-the-shelf delivery

MORSE EBERHARDT-DENVER CONVEYOR DRIVES

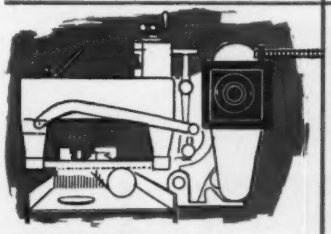
★ **No design limitation . . . up, down, or 90° mounting ★ one-piece alloy cast iron housing ★ high torque capacity ★ single or double reduction gears ★ input ratings from .12 hp to 53.72 hp using double worm reduction or helical worm reduction ★ ratios from 5:1 up to 3600:1—from stock at low factory prices.**



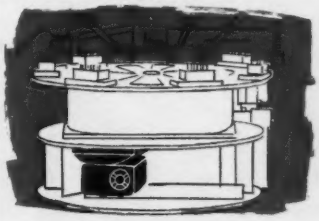
OVERHEAD . . . typical caterpillar or sprocket drives



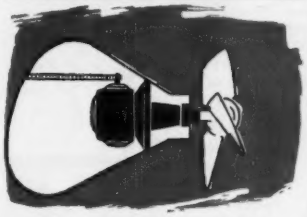
SUB-FLOOR . . . for towline or special equipment



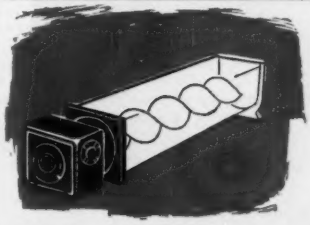
90° MOUNTING . . . for heavy-duty metal saws and machines



VERTICAL . . . base mounting for power turntable machines



SIDE MOUNTED . . . paint, pulp, liquid, or chemical agitators



HORIZONTAL . . . screw conveyors, straight or angular mounts . . . and scores of standard or special uses.

Easy-mount design . . . only 4 bolts

Morse E-D speed reducers lead in limitless applications with utmost ease in mounting. The 4 holes form a perfect square concentric to the output shaft. Unlike most designs, Morse E-D speed reducers feature oversize bearings on wide centers . . . resulting in an overhung load capacity at the end of the output shaft equal to the torque capacity.

Mounting versatility with the unit's cast-in base makes Morse drives adaptable to conveyors of all types, agitators, screw conveyors, machines, and for any other transmission of power where dependable speed reduction is specified.

You'll find Morse "standard" drives ready for immediate delivery . . . often eliminate the problems of "specials." Check with your Morse distributor, he's listed in the Yellow Pages under "Power Transmission," or write Morse Chain Company, Dept. 2-30, Ithaca, N. Y. for illustrated catalogs. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ontario.

MORSE B-W

A BORG-WARNER INDUSTRY

This shop cuts costs by using **STANICUT Oil 137**

Machines seven metals, one plastic with this one cutting fluid

Shank Manufacturing Company, Chicago, cuts production costs three ways by using STANICUT Oil 137 BCS. (1) The 15 Warner & Swasey Lathes are never down for change of cutting fluid when the metal being worked is changed. There's no time lost with shutting down, cleaning up and changing oil. (2) There are no losses from the use of the wrong cutting fluid. (3) Floor space is used for productive machinery instead of being tied up as storage space for barrels of different cutting fluids.

Titanium, brass, alloy steel, aluminum and seven grades of Stainless plus Teflon plastic are all worked on the machines. Latest equipment, a reputation for good work, experienced operators and on-time delivery keep business coming to Shank. STANICUT Oil 137 BCS helps Shank hold down manufacturing costs.

Does cutting costs with a cutting fluid interest you? Let one of Standard Oil's experienced lubrication specialists show you how STANICUT Oil 137 BCS can do it. Call the Standard Oil office nearest you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Commercially pure AMS 4921 Titanium oxygen injector nozzle gets an inspection from Frank Kruppe, Shank president (right), and Standard Oil's Henry Krueger. Hank Krueger provides Shank plant with technical service on cutting fluids and lubrication. Hank has the experience for this work. He's been doing it for six years. He has an engineering degree from Illinois Institute of Technology and has completed the Standard Oil Sales Engineering School course.

Quick facts about STANICUT OIL 137 BCS

- Has excellent extreme pressure properties. Ideal for low machinability steels.
- Has medium-low viscosity. Low enough for rapid, cooling flow. High enough to avoid "fogging".
- Non-corrosive to aluminum, *titanium* and all steels, tools and machines.
- Sterile, non-irritating and non-toxic.
- Suitable for many operations—tapping, threading, drilling, gear shaving, broaching, etc. Gives excellent tool life.

You expect more from **STANDARD** *and you get it!*

"Miking up" one of the pieces Shank produces, Frank Kruppe shows Hank Krueger quality of work turned out using STANICUT Oil 137 BCS.

WHAT'S COOKING
FOR YOU AT THE
HOUSE OF STAINLESS?
SCHEDULE 5 STAINLESS STEEL PIPE AND WELDING FITTINGS
. . . Hot Off the Shelf!
Complete stocks of types 304 and 316, in diameters ¼" through 8". This lighter-wall pipe provides greater internal flow area for savings in cost over other pipe schedules.
17-4 PRECIPITATION HARDENING STAINLESS STEEL BAR AND WIRE
. . . First Warehouse Stocks in the Midwest!
Here is corrosion resistance equal to that of the 18-8 grades. Yet, with easy heat treatment, this 17-4 type gains a high degree of wear resistance (RC 40-44) and high strength (up to 200,000 psi). Mail coupon for booklet.
NOW . . . DISTRIBUTORS FOR INCO* ALLOYS in Bar, Wire and Strip
We are ready to fill your needs for Inco bars in sizes .002" diameter through ½" diameter; and strip widths through 7". Tubular products also available in these Inco alloys. Mail coupon for booklet.
* Trade mark of International Nickel Company
There's always something new on the "menu" at Chicago Steel Service where we are continually expanding our stocks of carbon, stainless and high alloys . . . to serve you better at this steel service center.
Just phone LAfayette 3-7210 or Mail the Coupon
Mail Coupon for Valuable FREE BOOKLETS!
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Box 6308, Chicago 80, Illinois
Gentlemen: Please rush booklets checked . . .
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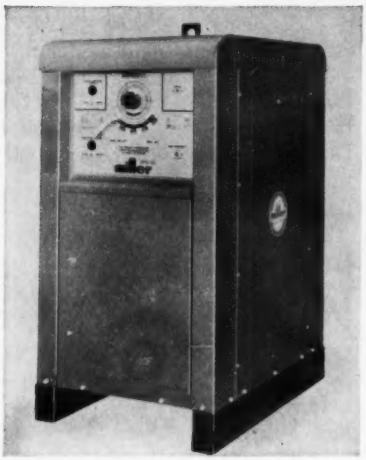
City Zone State
The House of Stainless
CHICAGO STEEL SERVICE COMPANY
Kinzie Avenue at 45th Street
Chicago 32, Illinois
Mailing Address: Box 6308
Chicago 80, Illinois

NEW PRODUCTS and equipment



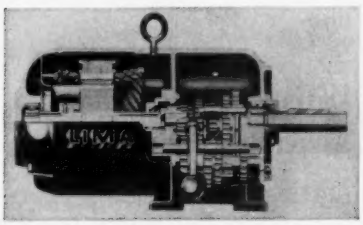
(*Concluded from Page* 176)

ing ranges (with wide overlap). A range control switch and rheostat controls for each of the five ranges are on the panel. Hand or foot remote controls are available.

For further information, *write* Miller Electric Mfg. Co. Inc., 781 Bounds St., Appleton, Wis.

Gearshift Drive Unit Mounts in Any Position

YOU CAN PUT the Type R3 selective four or eight speed gearshift drive in any mounting position. Design changes include stressproof steel shafting in the motor and gearbox. Hardened splines are used on the splineshaft.



The unit is furnished with standard, single speed motors of 1800, 1200, or 900 rpm with horsepower ratings of 1, 1½, 2, 3, and 5. Two speed motors are available. Gear ratios from low to high are 4.15:1, 3.15:1, 1.85:1, and 1.00:1. Two speed motors double the speed selection (according to motor input rpm). Dripproof or totally en-

Another H&S Speed Reducer *on a tough job...*

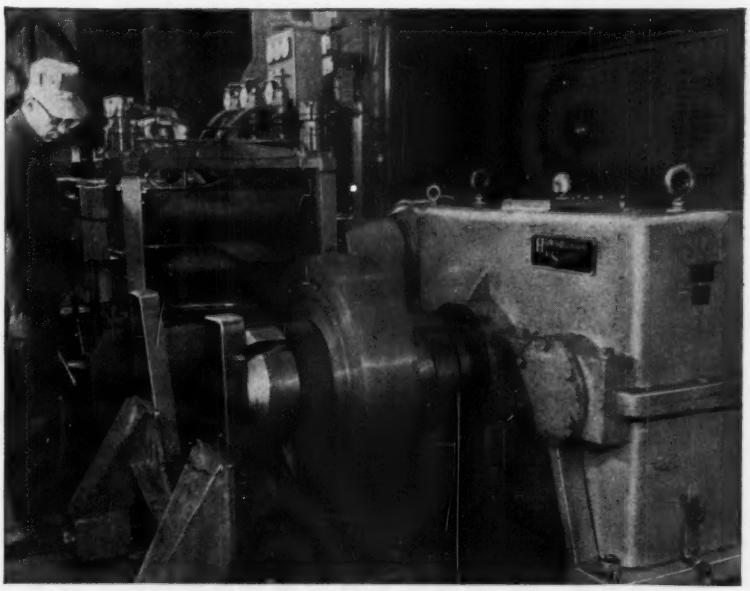
Built rugged for a critical rewind operation, this heavy overhung-load type H & S Herringbone Speed Reducer delivers day-in-day-out service under exacting load conditions.

This standard unit was selected for use on a Bliss precision rewind coiling machine—where strip steel must undergo tension controlled recoiling for subsequent annealing treatment.

Notice the sturdy shaft, with heavy-duty bearings designed to take this heavy overhung load. Observe the rugged housing, made to last.

This built-in toughness typifies H & S construction—on helical, herringbone, worm and combination units.

Send for detailed information on our facilities for producing a complete line of gears and speed reducers in a wide range of sizes and ratings.



Heavily loaded pay-off reel being driven by H & S Speed Reducer in plant of The Acme Steel Company, Chicago.

H&S The HORSBURGH & SCOTT CO.

5112 Hamilton Avenue • Cleveland 14, Ohio

Specializing in fast production of quality Speed Reducers and Gearing to meet custom requirements.

JF SERIES

EASY SAFE EFFICIENT LIFTING!

IT'S EASY to raise or lower loads while pulling a trolley mounted Coffing Quik-Lift Electric Hoist. The pistol-grip control station and the combination strain cable and control cord makes this possible. The light but strong aluminum housing provides ease of portability. Changing voltages, limit switch, type of suspension or chain is quick because the housing is in sections.

FOR SAFETY the control station is made of non-conducting plastic in which the voltage is reduced to 115 volts and the push-buttons are interlocked. The V-type brake which provides maximum braking surface and positive control of loads is another safety measure.

FOR EFFICIENCY this hoist has been designed to bring heavy-duty performance plus durability to the portable hoist field. It will pay you to specify Coffing Quik-Lift. Twenty models—capacities range from ¼ to 2 tons. Ask your distributor for details or write for Bulletin ADH-65.

COFFING HOISTS

DUFF-NORTON COMPANY

813 Walter Street • Danville, Illinois

COFFING HOISTS
Ratchet Lever • Air
Hand Chain • Electric

DUFF-NORTON JACKS
Ratchet • Screw
Hydraulic • Worm Gear

NEW PRODUCTS and equipment

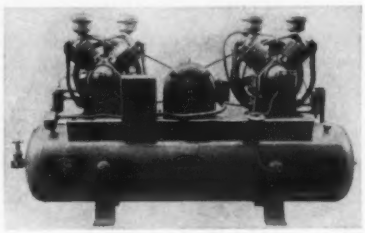
(*Concluded from Page* 179)

closed Lima motors are optional.

For further information, *write* Dept. 149, Lima Electric Motor Co. Inc., a subsidiary of Consolidated Diesel Electric Corp., Dixie Highway, Lima, Ohio.

Air Compressors Have 120 Gallon Reservoirs

MAXIMUM working pressure is 200 psi for the 15 and 20 hp Champion industrial air compressors. The new line has 120 gallon tanks and "Hy-T" belts (two for each pump). The units use two Model RE-36 pumps driven by a single motor.



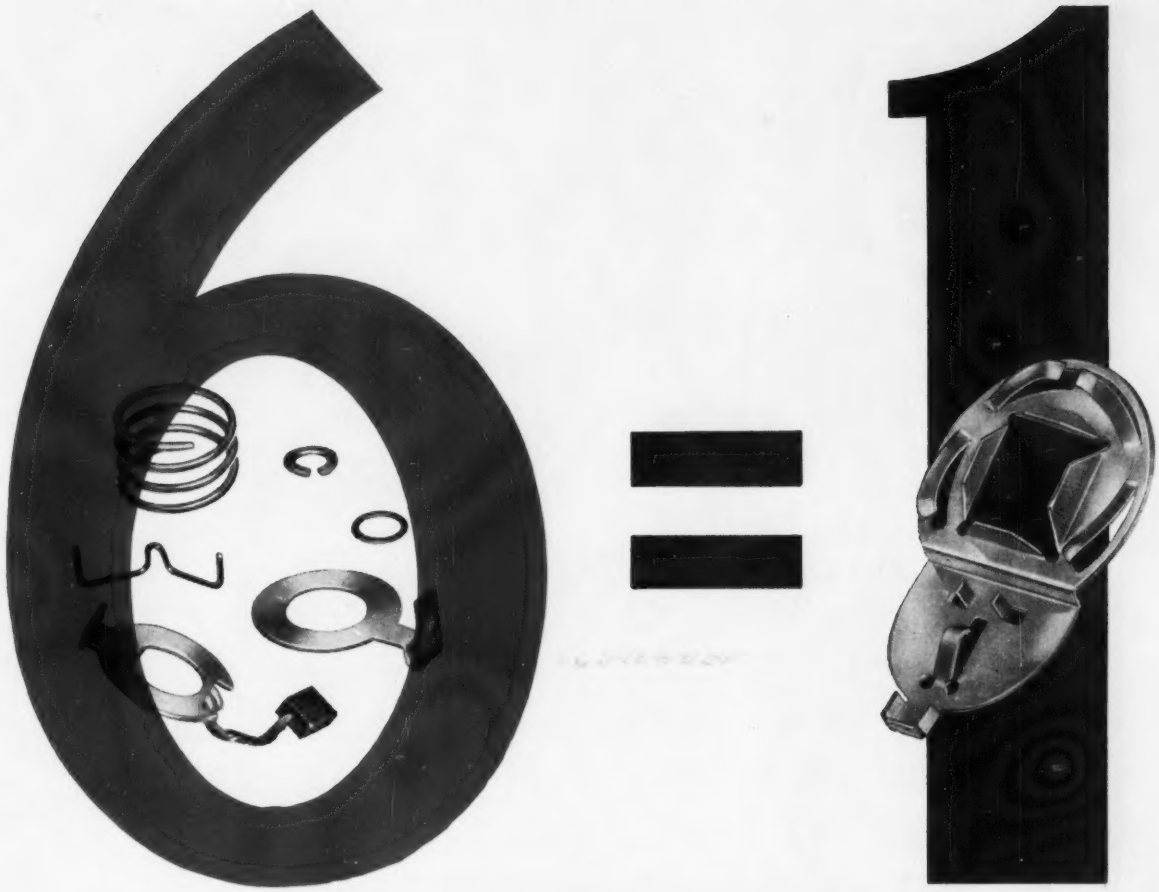
The compressors are equipped with magnetic starters (unless otherwise specified). Displacement of the 15 hp model is 76 cfm at 100 psi and 63.4 cfm at 200 psi. For the 20 hp model, it's 96 cfm at 100 psi and 80 cfm at 200 psi. The units are 95 in. long, 54 in. high, and 28 in. wide.

For further information, *write* Champion Pneumatic Machinery Co., 838 N. Pleasant St., Princeton, Ill.

Lifting Magnets Have Aluminum Field Coils

LIFTING capacity equal to conventional heavy duty units is provided by magnets in 36, 39, 45, 55, and 66 in. diameters having aluminum field coils.

Aluminum eliminates bulky insulation, saves weight, and reduces the possibility of burnout, says the company. By decreasing layer to layer voltages in the coil, over-all efficiency is increased. Of welded construction, the units are watertight, have replaceable pole shoes,



with re-design 'rithmetic

One flat spring now does the work previously required of the six parts shown—and greatly simplifies assembly, too. This single multi-purpose spring (a) holds a carbon brush in a rheostat, (b) applies pressure on the wire windings, (c) provides friction detent action, (d) acts as a retainer on the rotating shaft.

How did this come about? The maker of the rheostat undertook a complete redesign analysis, called in an A.S.C. Spring Engineer when it concerned the spring.

Early consultation with A.S.C. springmakers in new or redesign projects gives greater range to plans, safeguards against high production costs. Our booklet, "Designing Springs for Performance," may help you. Write for your copy.

5902

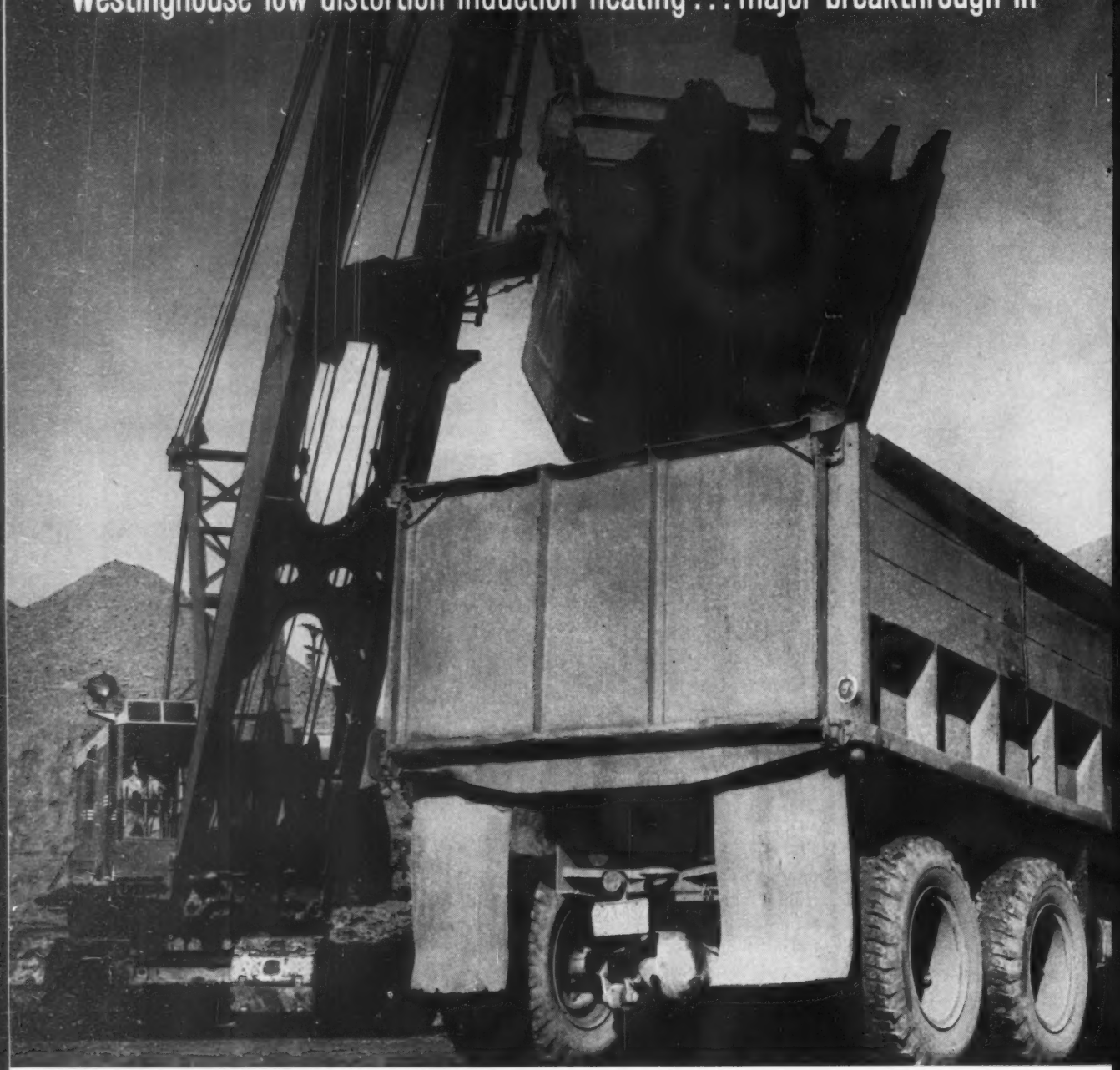
Associated Spring Corporation

General Offices: Bristol, Connecticut

Wallace Barnes Division, Bristol, Conn. and Syracuse, N. Y.
B-G-R Division, Plymouth and Ann Arbor, Mich.
Gibson Division, Chicago 14, Ill.
Milwaukee Division, Milwaukee, Wis.
Raymond Manufacturing Division, Corry, Penna.
Ohio Division, Dayton, Ohio
F. N. Manross and Sons Division, Bristol, Conn.
San Francisco Sales Office, Saratoga, Calif.
Seaboard Pacific Division, Gardena, Calif.
Cleveland Sales Office, Cleveland, Ohio
Dunbar Brothers Division, Bristol, Conn.
Wallace Barnes Steel Division, Bristol, Conn.

Canadian Subsidiary: Wallace Barnes Co., Ltd., Hamilton, Ont. and Montreal, Que. Puerto Rican Subsidiary: Associated Spring of Puerto Rico, Inc., Carolina, P.R.

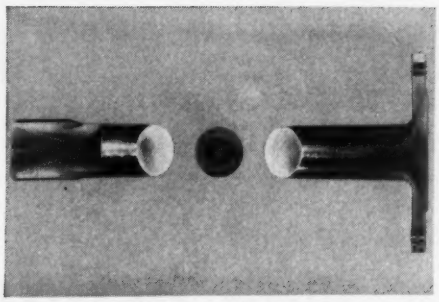
Westinghouse low distortion induction heating . . . major breakthrough in



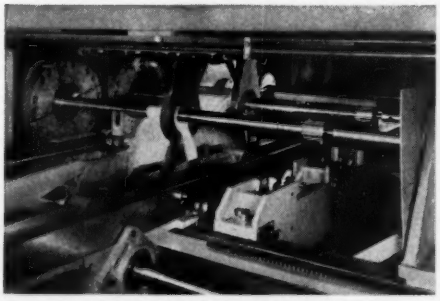
An axle has to be extra tough to take this kind of punishment. Low distortion induction heat treating makes it possible.

Why heavy duty trucks shoulder bigger loads

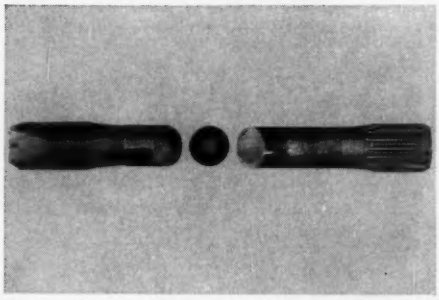
Conventional heat treating wasn't good enough for heavy duty truck manufacturers. They wanted a process that would increase axle strength with minimum distortion. That's why they are installing Westinghouse *low distortion* Induction Heating. Higher cost? Not with this new Westinghouse equipment. This method of induction hardening will actually cut costs . . . two ways. First — no cold straightening required. Second — Westinghouse tests prove that axles made with 1041 carbon steel induction hardened with Westinghouse low distortion equipment are 50% stronger than axles made with 4150 alloy hardened in a furnace. Manufacturers also realize a savings of 2c per pound on material cost by using 1041 carbon steel instead of the 4150 alloy.



Westinghouse *low distortion* induction heating on a typical axle provided tensile strengths up to 300,000 psi using 1041 carbon steel. This compares with 200,000 psi using 4150 alloy and furnace treating.



The rugged Westinghouse Induction Scanner installs directly into the production line. No warm-up time required, no hot stock inventory. Equipment can be made to match your present and future production requirements.



Westinghouse induction heating offers more precise control of heated depth making it possible to replace a furnace treated alloy steel with a low carbon type.

without Axle Failure

Think of the savings Westinghouse low distortion Induction Heating would bring to you. Lower labor costs. Lower cost raw material. Fewer replacements. Better customer satisfaction. For complete details call or write your Westinghouse representative or Westinghouse Electric Corporation, Industrial Electronics Department, Baltimore 3, Maryland.

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

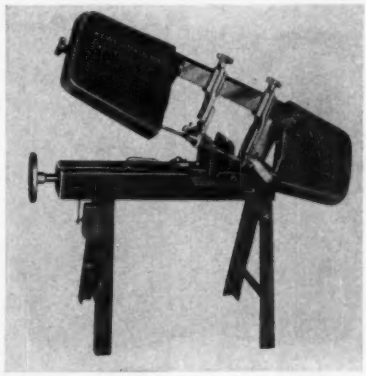
J-35010

and are equipped with recessed and protected terminal boxes.

For further information, *write* Stearns Magnetic Products, 635 S. 28th St., Milwaukee 46, Wis.

Metal Cutting Bandsaw Is More Rigid, Stronger

GREATER RIGIDITY and strength are the result of a redesigned welded band frame and band cover on the Model A-6 horizontal, metal cutting bandsaw. The cutting head is now similar in appearance to the larger machines in the line.



The saw has a 6 x 10 in. cutting capacity; ⅓ hp motor; 60, 90, and 120 fpm blade speeds; and a 94 x 0.5 x 0.025 in. blade.

For further information, *write* W. F. Wells & Sons Inc., 1950 Thomas Rd., Three Rivers, Mich.

Environmental Chamber Cools Down to -140° F

METAL ALLOYS can be processed and stabilized rapidly in the Webber low temperature environmental chamber. AM-350 stainless steel, molybdenum, titanium, and tantalum are some of the metals that can be treated.

The unit can cool 300 lb of steel from 80 to −125° F in 60 minutes. Low point of the unit's temperature range is −140° F. Air circulation eliminates stratification.

Inside dimensions are 72 x 36 x 36 in. The interior, made of 16 gage stainless steel, has a reinforced bot-

....only with hydraulic design

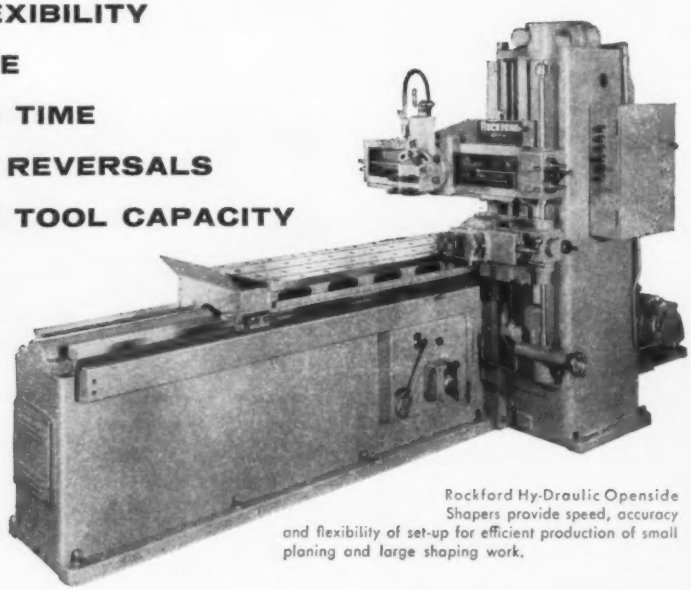
GREAT SET-UP FLEXIBILITY

WIDE WORK RANGE

SHORT MACHINING TIME

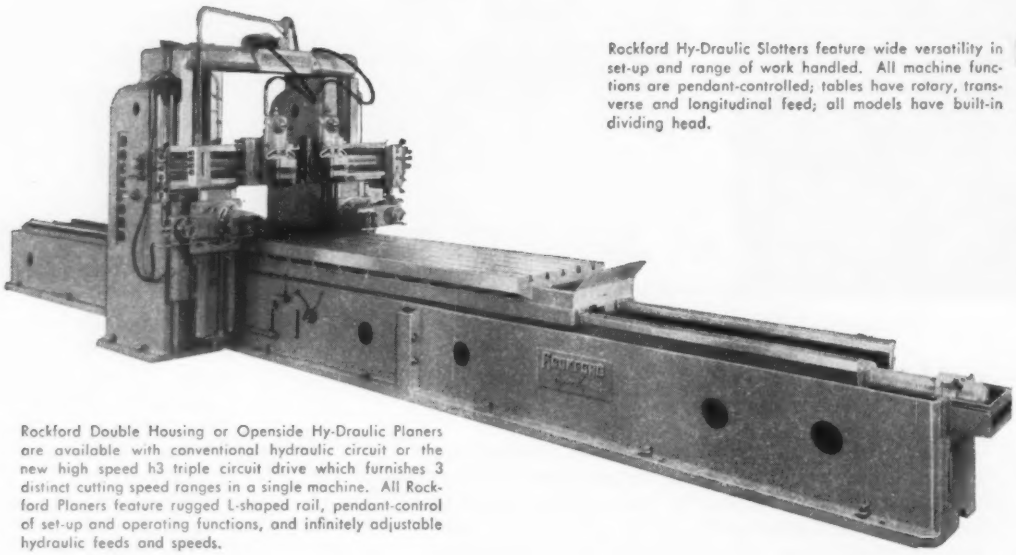
HIGH-SPEED, FAST REVERSALS

NATURAL CARBIDE TOOL CAPACITY



Rockford Hy-Draulic Openside Shapers provide speed, accuracy and flexibility of set-up for efficient production of small planing and large shaping work.

Rockford Hy-Draulic Slotters feature wide versatility in set-up and range of work handled. All machine functions are pendant-controlled; tables have rotary, transverse and longitudinal feed; all models have built-in dividing head.



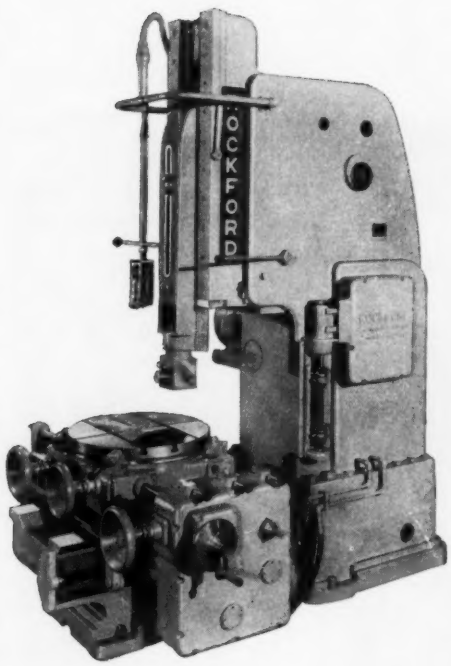
Rockford Double Housing or Openside Hy-Draulic Planers are available with conventional hydraulic circuit or the new high speed h3 triple circuit drive which furnishes 3 distinct cutting speed ranges in a single machine. All Rockford Planers feature rugged L-shaped rail, pendant-control of set-up and operating functions, and infinitely adjustable hydraulic feeds and speeds.

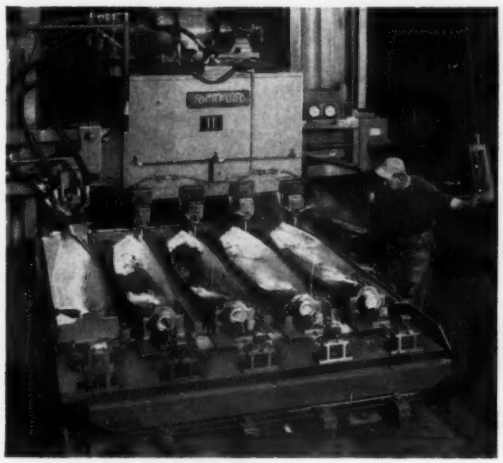
Hydraulic drive and feeds, as basic features of Rockford Hydraulic Machine Tools, provide outstanding performance measured in terms of work quality, high production and low operating cost. They also provide the cushioning action essential to the use of modern carbide tools.

do you get these advantages!

Today, countless metal-cutting operations are performed effortlessly, at low cost, and with high production rates on Rockford Hy-Draulic designed machines. Hydraulic control and power respond instantly so that inexperienced operators easily adapt infinite speeds and feeds to the most complex and accurate machining cuts.

Compare your present shaping, planing or slotting operations with these modern production features, and determine the savings available with Hy-Draulic flexibility. Our engineers will gladly furnish estimates for your particular requirements.





Rockford Hy-Draulic KOPY-KAT duplicator transfers single or 2-dimensional forms directly to the work on Rockford Hy-Draulic Shapers, Planers and Slotters. The hydraulic duplicator valve is so sensitive, so exact, that positive duplication of complex forms is completed with the ease of straight production machining.

RMT

ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET ROCKFORD, ILLINOIS

For Quality and Economy Use

MALLEABLE

For Service Contact...

CONNECTICUT
Connecticut Mall. Castings Co., New Haven 6
Eastern Malleable Iron Co., Naugatuck
New Haven Malleable Iron Co., New Haven 4

DELAWARE
Eastern Malleable Iron Co., Wilmington 99

ILLINOIS
Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Albion Malleable Iron Company, Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Mall. & Steel Castings Co., Indianapolis 22

IOWA
Iowa Malleable Iron Co., Fairfield

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

MICHIGAN
Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
Cadillac Malleable Iron Co., Cadillac
Central Fdry. Div., Gen. Motors, Saginaw

MINNESOTA
Northern Malleable Iron Co., St. Paul 6

MISSISSIPPI
Mississippi Malleable Iron Co., Meridian

NEW HAMPSHIRE
Laconia Malleable Iron Co., Laconia

NEW YORK
Acme Steel & Mall. Iron Works, Buffalo 7
Frazer & Jones Company Division Eastern Malleable Iron Co., Solvay
Oriskany Malleable Iron Co., Inc., Oriskany
Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
Maumee Malleable Castings Co., Toledo 5
National Mall. and Steel Castings Co., Cleveland 6

PENNSYLVANIA
Buck Iron Company, Inc., Philadelphia 22
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

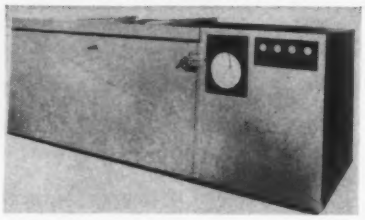
TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

These companies are members of the Malleable Castings Council

NEW PRODUCTS and equipment



tom (it withstands 1000 psi). The self-contained chamber requires connection to electrical and water lines. It's available for 220 or 440 volts, 3 phase, 60 cycles.

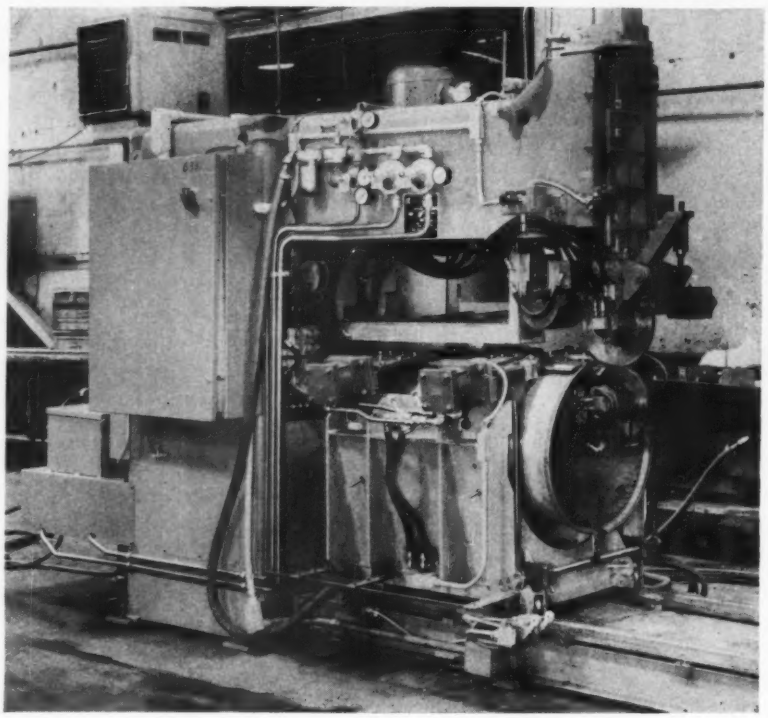
For further information, *write* Webber Mfg. Co. Inc., P. O. Box 217, Indianapolis 6, Ind.

Electroplating Attachment Cuts Time Requirements

SETUP and stopoff time are reduced in electroplating with the three Krome-King toolroom models. The timesaver is a hoist attachment which raises and lowers a plastic coated table into a self-controlled hard chrome plating solution.

The table holds the parts and acts as a current deflector to prevent buildup on ends and edges of the parts being plated. Working solution capacity of the three models ranges from 6 to 24 gallons.

For further information, *write* Krome-King Div., National File Co., 530 N. Cedar St., Lansing, Mich.



Machine Seamwelds Drums 40 in. Long

THE NATIONAL DRUM welder can handle seams of containers from 14 to 22½ in. in diameter and up to 40 in. long. One operator can make 250 fifty-five gallon drums an hour.

A flexible band permits a narrower lap (down to 3/32 in.), reduces weld thickness, and helps contain the drum properly during welding to eliminate splitting and pulling apart of the seam's trailing edge.

Operation: The flat sheet is loaded into the clamp as the reciprocating fixture moves into the

Schlieren photograph showing heated air rising from Malleable chain link at 1200° F.

For Hot Parts... Use Malleable

Heat them up, cool them off—ten thousand times. Heat them up, keep them hot—indefinitely... you'll find you can count on Malleable iron castings for an exceptional combination of safety and economy.

New research demonstrates that the rugged room-temperature characteristics of Malleable castings remain virtually unchanged up to 800° F! More important—from 800° F. to 1,200° F., Malleable castings are unique in providing safe, dependable service **without** sudden drop in strength.

Let a nearby Malleable castings producer help you develop better, more economical parts for elevated temperature applications. Send drawings or an outline of your requirements to any of the progressive companies that display this symbol—

MEMBER
MALLEABLE
CASTINGS COUNCIL

For detailed information on "Use of Malleable Castings in Elevated Temperature Applications," contact any company listed on the opposite page, or Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.

Now TOCCO Offers

RF Induction Heaters

with 5, 10, 15, 25, 50 and 60 kw output

FOR ALMOST 20 YEARS TOCCO has built and sold electronic, tube-type induction heaters, but now in 1960 we can offer a wider range of sizes than ever before to meet every RF heating requirement. TOCCOtron units are available with a nominal frequency of 450,000 c.p.s. or 4 megacycles for very high frequency applications. All are dependable, rugged production machines—*not* fragile laboratory instruments which are difficult and expensive to maintain.

15 kw, 450,000 c.p.s. TOCCOtron unit. Note double doors for easy accessibility to interior components—an advantage common to all TOCCOtron units. All TOCCO equipment is certified to comply with the rules and regulations of the Federal Communications Commission.

Check these advantages:

- ☐ The industrial heavy-gauge steel cabinet which completely encloses all high potential circuits preventing radiation interference and personnel hazards.
- ☐ Meters in all sensitive circuits to enable the user to obtain the maximum output and efficiency.
- ☐ High KVA tank circuits and adjustable plate voltage, grid bias and grid drive controls where desirable, allow easy matching to all loads.
- ☐ Externally mounted circuit breaker and disconnect located so that it is easily accessible. JIC type enclosure which separates all control components from the high voltage circuits.
- ☐ Integral water systems available in most models—saves floor space and water consumption.
- ☐ Gasketed, lockable doors allow easy accessibility to all components. JIC type enclosure cooled with air to water heat exchanger.

Because TOCCO makes both audio frequency equipment (motor-generator sets) and radio frequency equipment (electronic tube-type units as shown), you can always count on a completely unbiased equipment recommendation—the right equipment for your particular heating job.

Mail Coupon Today! NEW FREE BULLETIN

The Ohio Crankshaft Company
Dept. 5-3, Cleveland 5, Ohio

Please send literature describing TOCCOtron Radio Frequency Induction Heating Equipment.

Name_____

Position_____

Company_____

Address_____

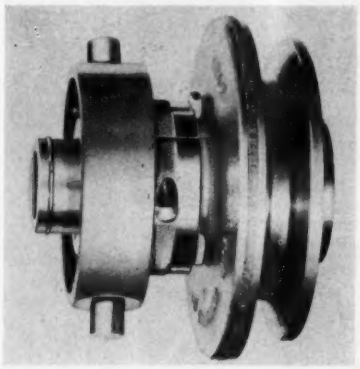
City_____ Zone_____ State_____

deep throated welder. On the return stroke, the seam is welded and the barrel is ejected automatically. The bands can be quickly changed. A 250 kva transformer provides welding power.

For further information, *write* National Electric Welding Machines Co., 1846 Trumbull, Bay City, Mich.

Heavy Duty Disc Clutches Handle Speeds to 4000 rpm

TYPES KB and KBB disc clutches are designed for heavy duty service on keyed stub or through shafts from $\frac{5}{8}$ to $1\frac{1}{4}$ in. in diameter and at speeds up to 4000 rpm. The units have integral single or double V-belt sheaves mounted on double seal ball bearings.



They're stocked in nominal OD sizes of $4\frac{1}{8}$, $4\frac{3}{4}$, and 5 in. You can use them with A and B belts having pitch diameters from 3.4 to 4.6 in. The clutches are controlled by a manual shift lever.

For further information, *write* Edgemont Machine Co., 2200 Home Ave., Dayton 17, Ohio.

Cleaner, Phosphatizer Treats Aluminum Surfaces

AN ALUMINUM cleaner, brightener, and phosphatizer called Alfos is available in powdered form. Solution ratio: 4 to 8 ounces of powder per gallon of water. The acid solution can be handled in steel tanks.

(*Please turn to Page* 194)

Foundrymen and steel men! Princess Wenatchee and Junior are campaigning to get your vote for Chief Keokuk, standard bearer of the Kemco Silvery party. Kemco Silvery deserves your consideration. It is the superior form of silicon introduction. It rates your vote because it tops all other candidates for economy and performance. When you think of Silicon . . . think of KEMCO!

KEMCO SILVERY PIG IRON

SILICON METAL - OTHER FERROALLOYS

Kemco Silvery melts evenly, holds silicon loss to a minimum, handles easily by magnet or count. Your choice of 60 lb. or 30 lb. pigs or 12½ lb. piglets in regular or alloy analysis for iron and steel production. Read the free booklet, "For Lower Costs, Higher Quality Products." Send for your copy now. Also check the performance of Kemco Silicon Metal in aluminum!

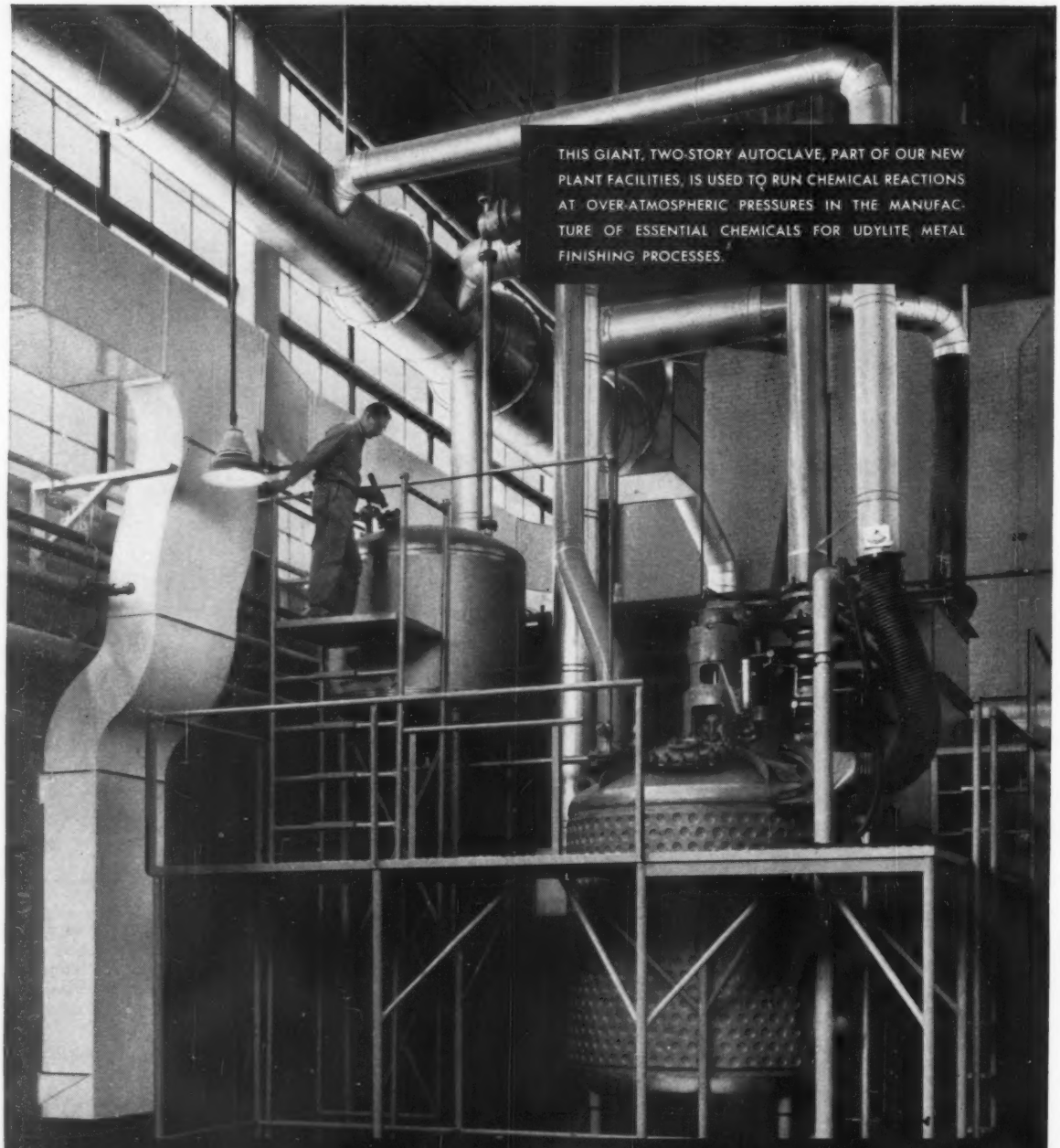
Keokuk Electro-Metals CO.

Division of Vanadium Corporation of America

Keokuk, Iowa • Wenatchee, Washington

Sales Agent: Miller and Company

332 S. Michigan Avenue, Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri



THIS GIANT, TWO-STORY AUTOCLAVE, PART OF OUR NEW PLANT FACILITIES, IS USED TO RUN CHEMICAL REACTIONS AT OVER-ATMOSPHERIC PRESSURES IN THE MANUFACTURE OF ESSENTIAL CHEMICALS FOR UDYLITE METAL FINISHING PROCESSES.

$600,000.00
Invested in your future:

It cost that much to complete additional new plant facilities at Udylite in order to guarantee you: *1*—absolute purity of product, *2*—stringent quality controls, *3*—reasonable price schedules. Now you can *depend* on these benefits from Udylite for years ahead, as our industry expands.

the udylite corporation
Detroit 11, Michigan

on the west coast:
the L. H. Butcher Company

Forward March in 1960...

Udylite offers new products, processes

MAJOR DEVELOPMENTS IN EVERY PHASE OF THE INDUSTRY COME FROM THE WORLD'S LARGEST PLATING SUPPLIER

Udylite steps up the production of new equipment and processes and continues its expanding program of research and new product development. Here are some of the New benefit-packed innovations that Udylite has ready for you NOW.

New Barrel assembly Just released, Udylok-Tempron Barrel Assembly . . . unique interlocking cylinder construction which permits speedy field repair . . . tie-rod-free construction . . . twelve machine screws the only metal used in cylinder . . . advanced ring gear design with heavy duty, four pitch gearing for greater strength . . . longer life . . . made of non-corrosive Udylon . . . *and* a revolutionary new superstructure design.

New Rectifier line A whole new line . . . completely re-designed from the ground up . . . economies affected with new method of manufacture mean real savings in your original cost . . . keep maintenance and replacement costs minimum . . . fully guaranteed and built to usual high standards of Udylite quality construction.

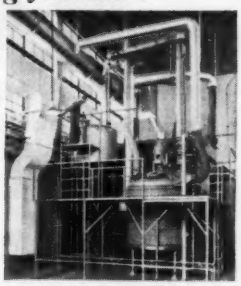
New Tank lining Brand new tank lining . . . for special applications . . . introducing a new recently perfected material of unusual properties . . . an EXCLUSIVE with Udylite.

New Filter series Improved . . . high area . . . low pressure filters . . . designed with economy of operation in mind for you . . . long range savings . . . low, low maintenance costs . . . greatly increased efficiency . . . full range of sizes and capacities.

New Processes due Another great forward step in the battle against corrosion . . . A NEW Udylite bright plate process . . . now under rigorous testing for introduction early in the spring . . . a product of the continuing research and development that gave you "The Incomparable 66" and Bi/NICKEL.

New Automatic Machine features Plating automation . . . equipment advances . . . including new skip mechanism . . . 1960 models of Cyclemaster . . . and the famous Udylite V.I.P., automated barrel plating machine . . . to fit economy budgets.

New manufacturing facilities $600,000.00 expansion program at Udylite, Detroit . . . installation permits quality controlled production of vital raw materials . . . guarantees source of supply . . . provides you with product of insured purity . . . at a reasonable price.



Giant autoclave . . . new plant facility at Udylite

The newest and the best in plating supplies, equipment and processes . . . products such as those shown here flow constantly from Udylite to industry. Watch for detailed announcements every month. If you'd like to learn more about any of the developments we've talked about right away, just get in touch with your Udylite man today or write to:

the udylite corporation • Detroit 11, Michigan
world's largest plating supplier

on the west coast the:
L. H. Butcher Company

NEW PRODUCTS and equipment

(*Concluded from Page* 191)

The liquid should be kept between 180 and 200° F while in use.

Short immersion time will produce a bright surface. A longer immersion time will produce a slightly frosty etch and a phosphate coating with better paint adhesion qualities.

For further information, *write* Clarkson Laboratories Inc., 930 N. Darien St., Philadelphia 23, Pa.

Ultrasonic Cleaning Unit Has 12 Gallon Tank

HIGH ENERGY density requirements in ultrasonic cleaning can be met by the Model 260 unit. Driving elements cover 50 per cent of the tank bottom (capacity: 12 gallons). The stainless steel tank is 16 in. long, 16 in. deep, and 12 in. wide. Radiating surface is 96 sq. in.

The 115 volt ac generator (single phase, 60 cycle) is designed for continuous operation and delivers an average 500 watt output with peaks of 2000 watts.

The unit has a 0 to 60 minute timer, a one-tube oscillator, provision for remote control of equipment, front panel switching between two transducers, circuit breaker, and three wire ground protection.

For further information, *write* National Ultrasonic Corp., 111 Montgomery Ave., Irvington 11, N. J.

How our small plant solved its waste disposal problem WITHOUT CAPITAL OUTLAY...

Pat. No. 2,900,096

DEMPSTER-DUMPMASTER Equipped Hauler Provides Containers and Service for Small Fee

Our small Midwestern manufacturing firm did not generate enough refuse to justify ownership of its own refuse disposal system. Yet, it was plagued by unsightly trash piles, fire hazards and scattered refuse in the plant yard.

Our plant engineer then heard of a DEMPSTER-DUMPMASTER equipped private hauler in the adjoining city. A survey revealed that two big-capacity refuse containers, placed one at each end of the plant, would handle the entire refuse accumulation.

The private hauler placed the containers, and a small monthly fee covered maintenance, labor, hauling and dumping refuse. No capital outlay was involved, disposal costs were reduced, and plant housekeeping was vastly improved.

In all major cities, private haulers who own DEMPSTER-DUMPMASTER equipment render fast, efficient, low-cost refuse storage and collection service. They place one or 100 containers at your service for a reasonable fee. A free brochure describes their service in detail.

Free Brochure and Name of Nearest Private Hauler on Request

Dept. S-3 DEMPSTER BROTHERS Knoxville 17, Tenn.

DEMPSTER-DUMPMASTER

DEMPSTER-DUMPSTER

DEMPSTER DUMPMASTER

EQUIPPED PRIVATE HAULERS

Ultrasonic Cleaner Compact, Uses Transistors

THE Uniblast ultrasonic cleaner is compact and transistorized. It's suited for such uses as the cleaning of small parts before, during, and after installation.

The self-contained unit has a generator and a recessed circular barium transducer in the base. Input: About 40 watts dc. Output: About 30 watts at 65 kc.

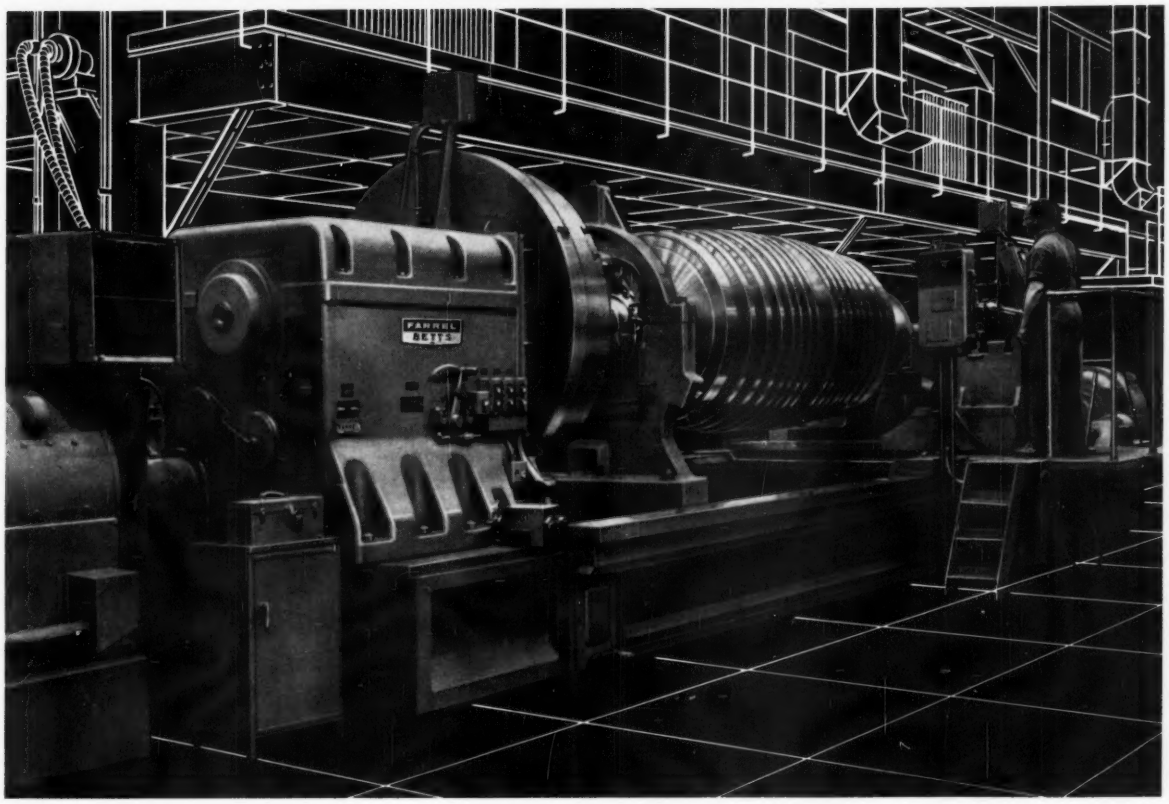
For further information, *write* Narda Ultrasonics Corp., 625 Main St., Westbury, N. Y.

Air Cooled Compressor Uses Treated Paper Filter

LESS internal strain, increased cooling efficiency, and reduced wear and maintenance are claimed for the air cooled Worthington compressors. Belt driven and Monobloc versions are available. In the Monobloc arrangement, the compressor and motor are contained in an integral, two stage unit. No moving parts are exposed.

Air is filtered through plasticized,

(*Please turn to Page* 200)



Consolidated turns machining objectives into reality

Specially designed for machining turbine rotor grooves from steel alloy forgings, this 60" lathe was built for one of the country's leading turbine manufacturers.

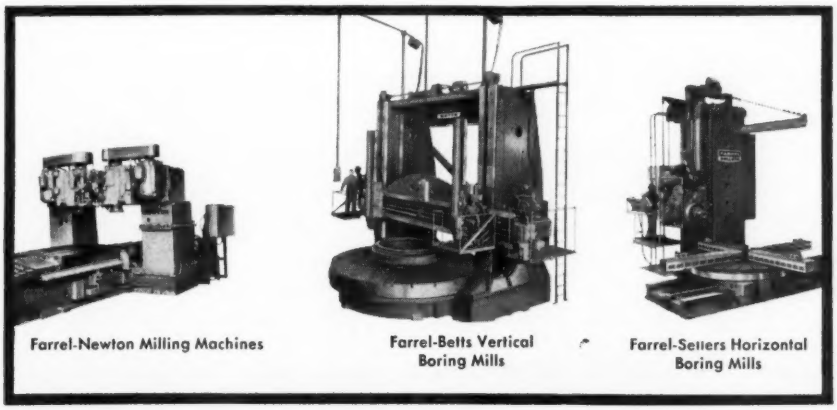
Rotors are grooved in a plunge cut by front and rear tools. The front tool takes out the center section of the chip and the rear tool takes out the two sides so that the slot is cut to full width in one pass. This is done at 220-sfpm speed and .028-ipm feed, resulting in a metal-removal rate of 168 cu. in. per minute. A special electrical dimensioning system indicates the carriage position along the bed for accurate groove positioning.

Proven ability to tailor each machine to the job is one reason why manufacturers come to Consolidated for heavy-duty machine tools. Remember, Consolidated has produced more types of heavy-duty machine tools than any other company in the United States.

Why not put this experience to work for you. Send for illustrated bulletins.

FARREL-BIRMINGHAM COMPANY, INC.
CONSOLIDATED MACHINE TOOL DIVISION
568 Blossom Road, Rochester 10, N. Y.
Telephone: BUtler 8-4600
Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.

CM-54



Farrel-Newton Milling Machines

Farrel-Betts Vertical Boring Mills

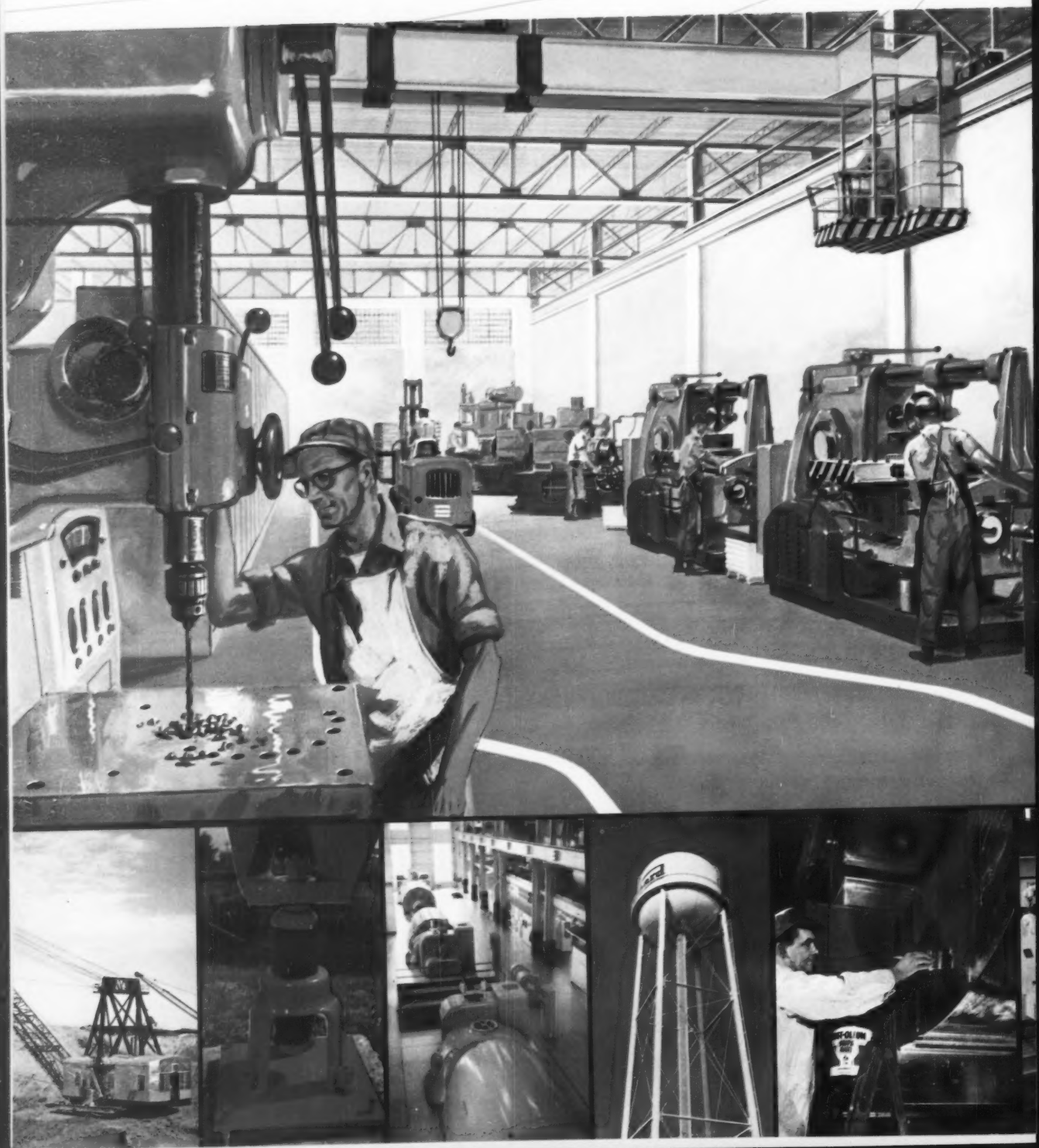
Farrel-Sellers Horizontal Boring Mills

FARREL
CONSOLIDATED

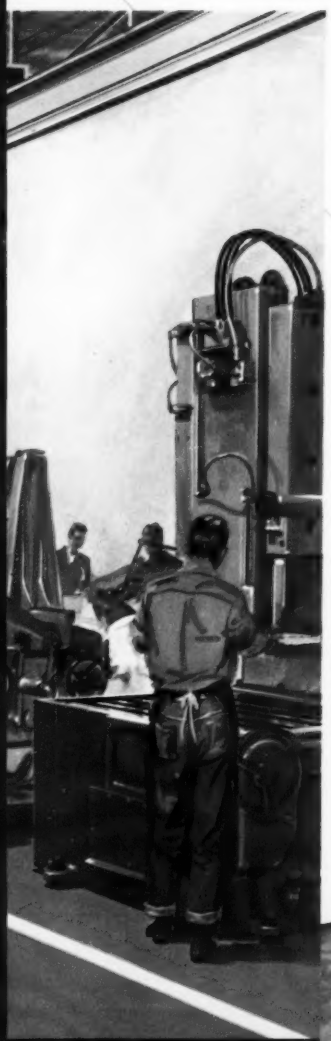
Engine Lathes • Roll Lathes • Vertical Boring and Turning Mills • Floor and Planer-type Horizontals • Planers, Double Housing and Openside • Planer-type Milling Machines • Plate-edge Planers • Vertical Slotters • Rotary and Straightline Production-type Milling Machines • Skin Mills and Cavity Mills for Aircraft Manufacturing • Circular Cold Saws • Railroad Wheel and Axle Machinery • Drill Grinders • Special Machine Tools

RUST-OLEUM.

NEW COLOR



HORIZONS System



STOPS RUST AND PROVIDES LASTING BEAUTY

Gone are the days when color was used for the sake of color alone. Today, color is functional—helping to improve morale and increase efficiency—serving to color-code and mark safety areas, etc. The Rust-Oleum New Color Horizons System goes even further. It combines four important factors (1) the ability to stop rust, (2) smart, modern color harmony, (3) the durability to last and last, (4) ease of application that saves time, money, and metal. See how this system can bring lasting beauty to your plant, machinery, equipment, tanks, fences, etc. Your Rust-Oleum Industrial Distributor, with your Rust-Oleum Factory Specialist, will be happy to survey your plant and provide complete recommendations. Prompt delivery is assured from Industrial Distributor stocks in all principal cities of the U.S., Canada, and many countries around the world.

Faced with coating problems like these? Heat resistance, water resistance, chemical resistance, floors, galvanized metal, coatings that will dry in less than thirty minutes? Rust-Oleum, in its various systems, can be your answer. Call your Rust-Oleum Industrial Distributor, or write for the facts.

Apply Rust-Oleum 769 Damp-Proof Red Primer directly over sound, rusted surfaces to STOP RUST and cut maintenance costs

Just scrape and wirebrush to remove rust scale and loose rust—then brush Rust-Oleum 769 Damp-Proof Red Primer right over the remaining rust. Its **specially-processed** fish oil vehicle penetrates rust to bare metal as proved in radioactive tracing studies. You save time and money, as costly surface preparations are usually reduced.

RUST-OLEUM®

See our catalog in Sweet's.

STOPS RUST!®

Distinctive as your own fingerprint.
There are imitations,
but only **one** Rust-Oleum.
Accept no substitute.

PROVED THROUGHOUT INDUSTRY FOR OVER THIRTY-FIVE YEARS

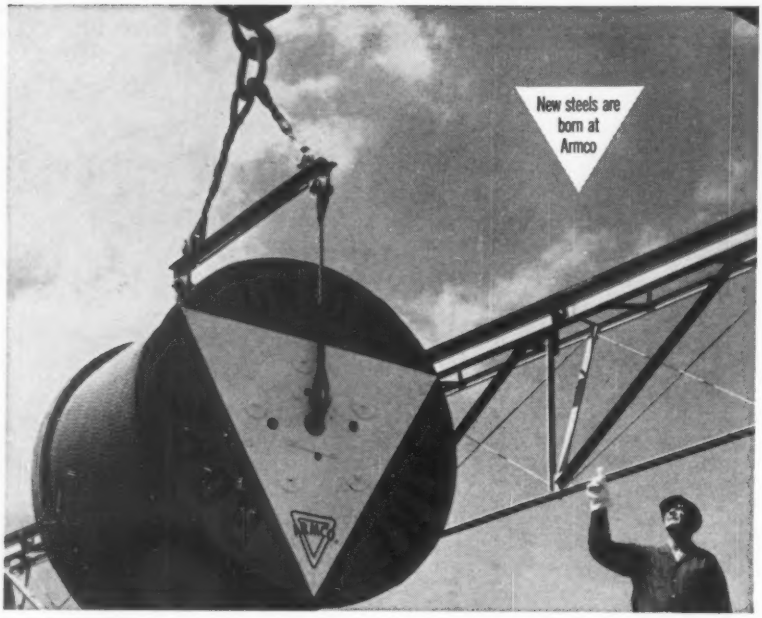
You take the brush! Try a free test sample!

ATTACH TO YOUR LETTERHEAD

RUST-OLEUM CORPORATION
2984 Oakton Street • Evanston, Illinois

At no cost or obligation, please send me:

- ☐ New full-color catalog on New Color Horizons System and specialized Rust-Oleum systems. Including color charts and applications.
- ☐ FREE TEST SAMPLE of Rust-Oleum 769 Damp-Proof Red Primer.
- ☐ Please have your representative contact us to discuss a plant survey.



Tuffy is famous for "firsts"

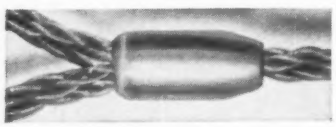
It's been that way for more than 30 years. Union Wire Rope started with an idea: that wire rope making should be a specialized field. And that the many different uses of wire rope needed specialized designs and constructions.

From that specialization have come many Union-developed "firsts." One of the most famous is the Tuffy line of patented 9-part machine-braided slings. The combination of extra strength and extra flexibility give you the ultimate in sling construction.

What does it mean to you as a sling user? Longer service life. Dependable operation. Greater safety. And ultimately the lowest cost sling you can buy, because of the extra service and efficiency.

Tuffy gives you these extras at no extra cost

Exclusive 9-part machine-braided fabric gives flexibility never found in any other sling. It's next to impossible to kink. If a kink should occur, it can be smoothed out easily leaving no damage.



Pressed-on metal ferrule gives the eye splice 100% of fabric strength. Applied under tremendous hydraulic pressure, it is also streamlined to eliminate projections and snags that might injure hands.

Get in Touch with Your Tuffy Distributor

Whether your sling jobs call for machine-braided Tuffy slings, or the new line of Union 6- and 8-part hand-braided slings, your Tuffy distributor is ready with the right item. Look him up in the Yellow Pages.

Tuffy® Tips
—on safe use of
Slings and Hoist Lines

Hoists vs. Hernia

About 75% of one manufacturer's compensation claims were connected with hernia — a common hazard in heavy lifting. Hernia claims average around $750. No need to stress the need for hoists instead of muscles for lifting tasks.

Hoist and Sling Safety Rules

1. Use a proper size hoist—not human backs and muscles—for every heavy lifting job.
2. Never use load chains as slings. Chain links break easily after distortion.
3. Use the sling that's right for the job. There's a Tuffy Sling for every purpose.
4. When loading slings with more than two legs: load a 3-legged sling as though it had 2½ legs; load a 4-legged sling as though it had 3 legs.

Use Tuffy Hoist Line

Tuffy Hoist Line and Tuffy Slings are the ideal team for efficient, safe hoisting at lowest long-run cost. The extra strength, toughness and service life we build into the Tuffys results in ultimate low cost.

FREE!
New Tuffy Sling Handbook

All about slings from A to Z, including types, dimensions and rated loads. Address **Union Wire Rope Corporation, 2160 Manchester Ave., Kansas City 26, Missouri.** Specialists in high carbon wire, wire rope, braided wire fabric, and stress relieved wire and strand.

2

UNION Wire Rope

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Southwest Steel Products

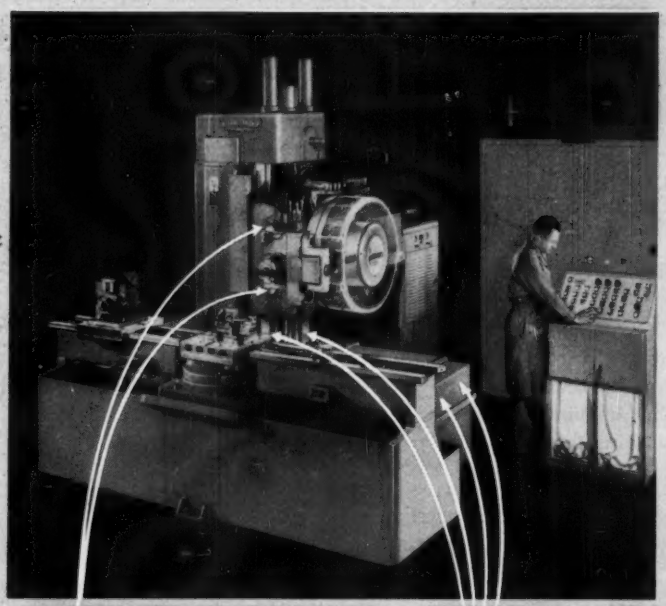
O-KNI-CO MACHINE TOOL news

PRODUCTION FACTS THAT INCREASE YOUR PROFITS

PUBLISHED BY THE OHIO KNIFE CO., CINCINNATI, OHIO

KEARNEY & TRECKER USE HARDENED WAYS MADE BY THE OHIO KNIFE CO. ON NEW MILWAUKEE-MATIC MACHINE

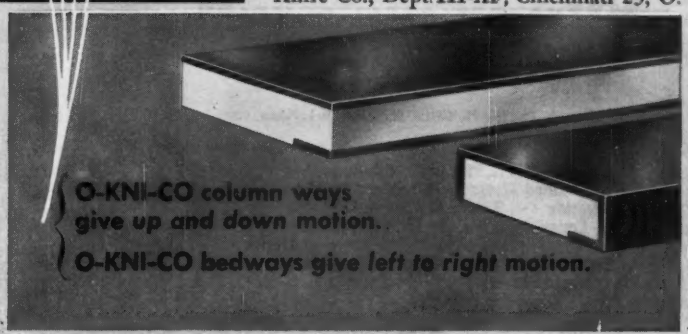
CONTINUOUS ACCURACY OF MACHINE ASSURED THROUGH HIGH WEAR RESISTANT QUALITIES OF O-KNI-CO HARDENED WAYS



Kearney & Trecker's new Milwaukee-matic with a tape fed numerical control system has to be able to deliver continuous accuracy. That's why hardened ways made by The Ohio Knife Co. were installed. O-KNI-CO ways guarantee continuous machine tool accuracy because of the special way in which they are made. By a time proven process, special analysis tool steel of any thickness is eternally bonded to a soft, tough, easily machinable steel, producing a way that will not warp or bow. Special O-KNI-CO hardening process (65-66 Rockwell C) to the full depth of the tool steel, along the entire length of the way, develops amazing wear resistant qualities.

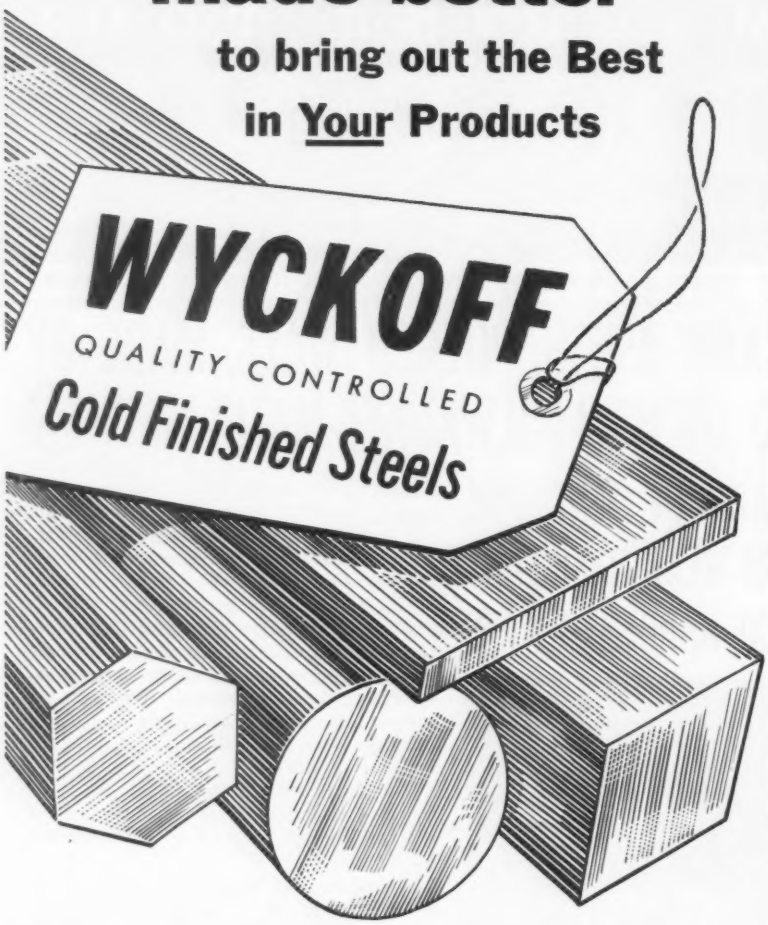
Ordinary ways of one type steel are usually heat treated by flame hardening, carburizing, etc. This results in variations of depth and quality of hardness along the length of the way. Their degree of hardness is usually well below the minimum standard (63 Rockwell C), necessary to eliminate galling, scoring and excessive wear. These conditions destroy the accuracy of the machine from the very first day of operation, requiring continuous compensations in positioning of work. O-KNI-CO hardened ways are carried in stock in a variety of sizes and shapes and are made to suit specific requirements.

For complete information write The Ohio Knife Co., Dept. 111-AF, Cincinnati 23, O.



made better

to bring out the Best in Your Products



Constant quality and metallurgical control throughout every step in the processing of Wyckoff Cold Finished Steels is your assurance of:

- *Ultimate Machinability*—in any type of screw machine or lathe
- *High Production Rates*—of closely dimensioned, accurate parts
- *Longer Tool Life*—requiring fewer tool grinds; minimum down time
- *Superior Surface Finish*—insuring close control of finished part
- *Physical Properties*—to meet your specifications

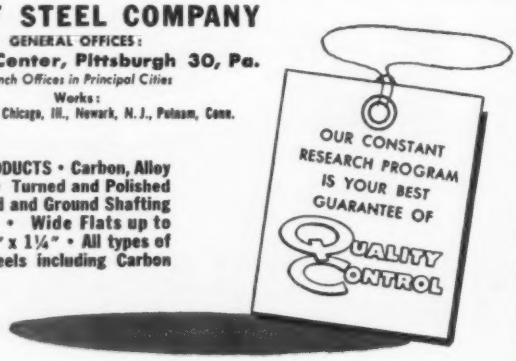
Let our metallurgists work with you in selecting the best analyses for your specific requirements.

SPECIALISTS IN COLD FINISHED STEELS EXCLUSIVELY

WYCKOFF STEEL COMPANY

GENERAL OFFICES:
Gateway Center, Pittsburgh 30, Pa.
Branch Offices in Principal Cities
Works:
Ambridge, Pa., Chicago, Ill., Newark, N. J., Putnam, Conn.

WYCKOFF STEEL PRODUCTS • Carbon, Alloy and Leaded Steels • Turned and Polished Shafting • Turned and Ground Shafting • Large Squares • Wide Flats up to 12¾" x 2¼" and 14" x 1¼" • All types of Furnace Treated Steels including Carbon Corrected Steels



NEW PRODUCTS and equipment

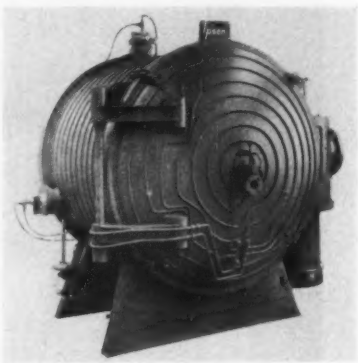
(*Concluded from Page* 194)

silicon treated paper. Tests show it keeps out 99 per cent of the dirt. The belt driven compressor is available in bare, base, and tank mounted models rated from 1½ to 15 hp and pressures from 60 to 250 psi. The X-shape Monobloc comes in 1½, 2, 3, and 5 hp sizes. The motors meet NEMA B requirements and are available for single phase, 60 cycle, 115/230 volts, or three phase, 60 cycle, 220/440 volts.

For further information, *write* Worthington Corp., 426 Worthington Ave., Harrison, N. J.

Heat Treating Furnace Has Graphite Elements

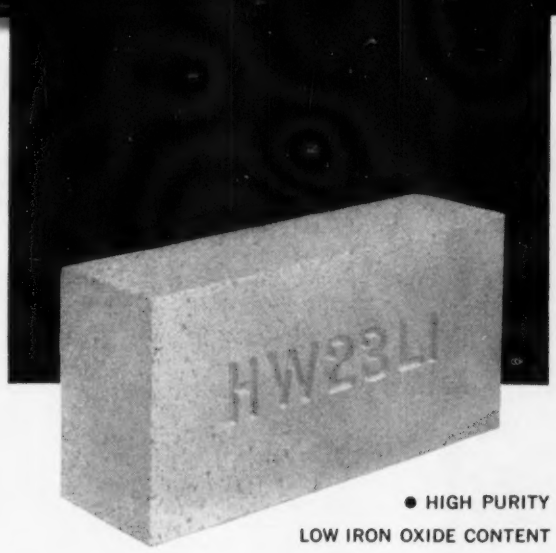
HERE is a general purpose vacuum heat treating unit than can be used for such jobs as high temperature copper brazing and heat treating gas turbine parts and assemblies. The furnace (Series V-5-750) has an operating temperature of 2600° F, a maximum operating pressure of 0.1 micron Hg, and takes a 150 kw/hr power supply.



A built-in transformer operates the 110 volt control circuits. The furnace is charged horizontally and has a molybdenum hearth. You can view the work through a sight glass during heating. Graphite heating elements are standard (molybdenum can be ordered).

The heat treating sequence can be operated automatically. The unit can be controlled manually at any time during the sequence.

For further information, *write* Ipsen Industries Inc., 721 S. Main St., Rockford, Ill.



• HIGH PURITY
LOW IRON OXIDE CONTENT

HARBISON-WALKER
HW23LI

insulating fire brick particularly suited for controlled atmosphere furnaces

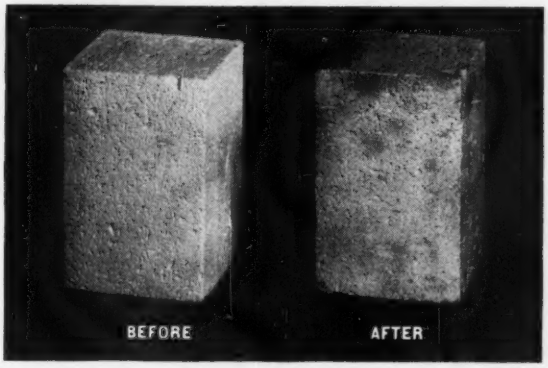
Harbison-Walker H-W 23 LI insulating fire brick produced primarily for controlled atmosphere furnace requirements contains in total not over 2% of accessory oxides, including iron oxide, which are subject to the influence of the usual furnace gas atmospheres. This enhanced property of resistance to the detrimental action of gases is accomplished without any sacrifice of other desirable physical characteristics.

Very low bulk density (27 to 30 pcf), augmented by minute pore size, accounts for its high insulating value. Exceedingly fine texture contributes to desirable glazing and to its good resistance to penetration by volatile fluxes.

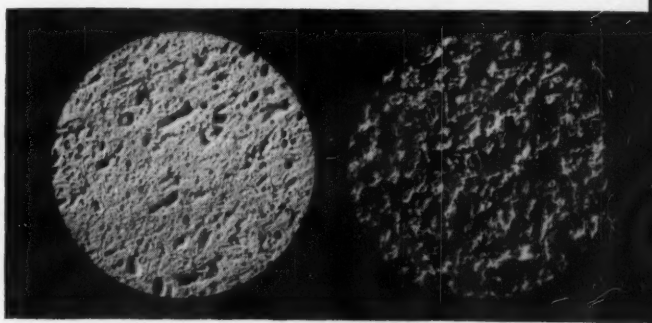
In the prescribed A.S.T.M. 210-46 test for 2300°F. insulating brick, the H-W 23 LI brand, when held at the maximum temperature for 24 hours, shows zero linear change.

The crushing and transverse strengths of H-W 23 LI are adequate for sustaining its weight and the thrust imposed in arches of relatively wide spans, up to its temperature limit.

The optimum combination of physical and chemical properties adapt H-W 23 LI fire brick to a wide variety of uses, in addition to controlled atmosphere furnaces. Write for complete specific information. A sample will illustrate its excellent workmanship.



H-W 23 LI before and after a 500-hour test in an atmosphere of 95% + carbon monoxide (per A.S.T.M.: C288-56), illustrating the high degree of immunity to disintegration by carbon deposition. In this test of long duration at the most critical temperature, H-W 23 LI was unaffected.



Magnification x2, illustrating pore size of H-W 23 LI.

Magnification x2 of another 2300°F insulating fire brick.

Harbison-Walker insulating products also include all conventional classes for service up to 3000°F.

Modern packaging in sturdy cartons assures safe transportation and efficient handling. Packed 25 to a carton.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
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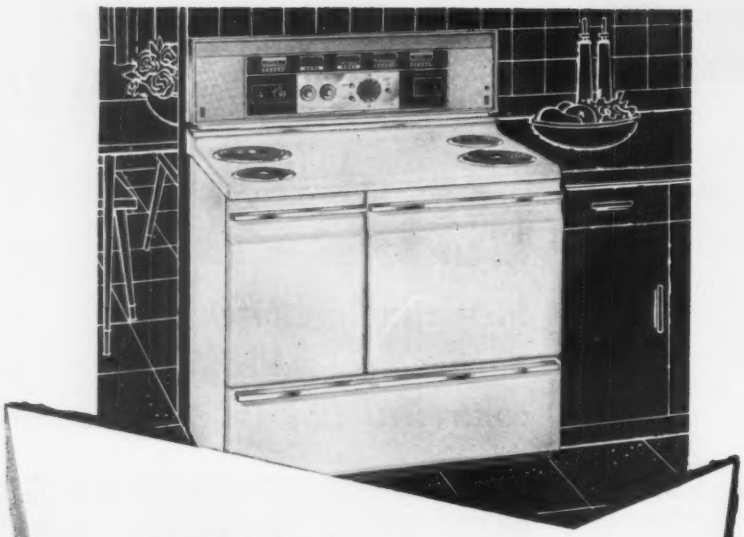
World's Most Complete Refractories Service

HW 60-6



Hotpoint relies on . . .

FEDERAL-WARCO

Federal Multi-gun, combination spot and projection welders are a vital link in the exacting production schedules of Hotpoint ranges. The Federal unit shown below welds and forms range frames—adjusts to accommodate five cabinet sizes—maintains high Hotpoint volume without sacrificing quality standards.

Leading metal fabricators throughout the country have learned they can rely on Federal resistance welders and Warco mechanical presses for dependable high speed performance. Precision engineered to your exact requirement by

THE FEDERAL MACHINE AND WELDER COMPANY
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Federal® WELDERS

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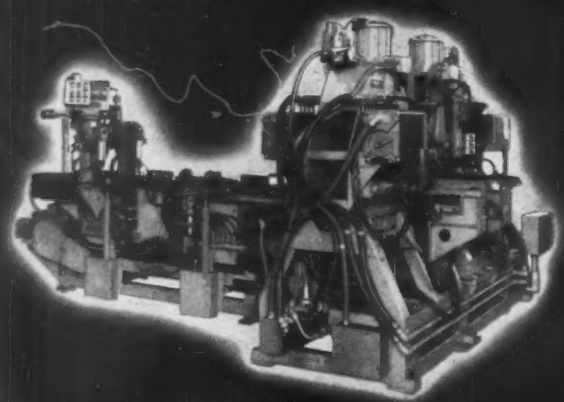


NEW literature

Write directly to the company for a copy

Abrasive Finishing Data

Data show how to produce such finishes as dull matte, dull satin, butler, semimirror and mirror on solid silver and silver alloys. Lea Mfg. Co., 16 Cherry Ave., Waterbury 20, Conn.

Thermostat Metal

How thermostat metal elements can be stacked to satisfy performance specification in space that prohibits the use of a single element with sufficient material volume is discussed in a 2 page bulletin, TRU-11. Metals & Controls Div., Texas Instruments Inc., 34 Forest St., Attleboro, Mass.

Leak Detectors

A 4 page brochure, 1857, contains tables of conversion factors, formulas, performance charts, hints, and other information for spectrometer type leak detectors. Analytical & Control Div., Consolidated Electrodynamics Corp., 360 Sierra Madre Villa, Pasadena, Calif.

Automation Tools

A low cost approach to automatic drilling, tapping, and fastening operations is the subject of an 8 page brochure. Customer Service Dept., Buckeye Tools Corp., P. O. Box 966, Dayton 1, Ohio.

Bearing Units

Catalog BU-103-A covers a complete line of bearing units. It contains load rating and comparison charts. Browning Mfg. Co., Maysville, Ky.

Screw Fastening of Aluminum

A 48 page volume covers the various types of standard and special fasteners and fastening systems used to join aluminum assemblies. Reynolds Metals Co., PRD-32, Richmond 18, Va.

Ultrasonic Cleaner

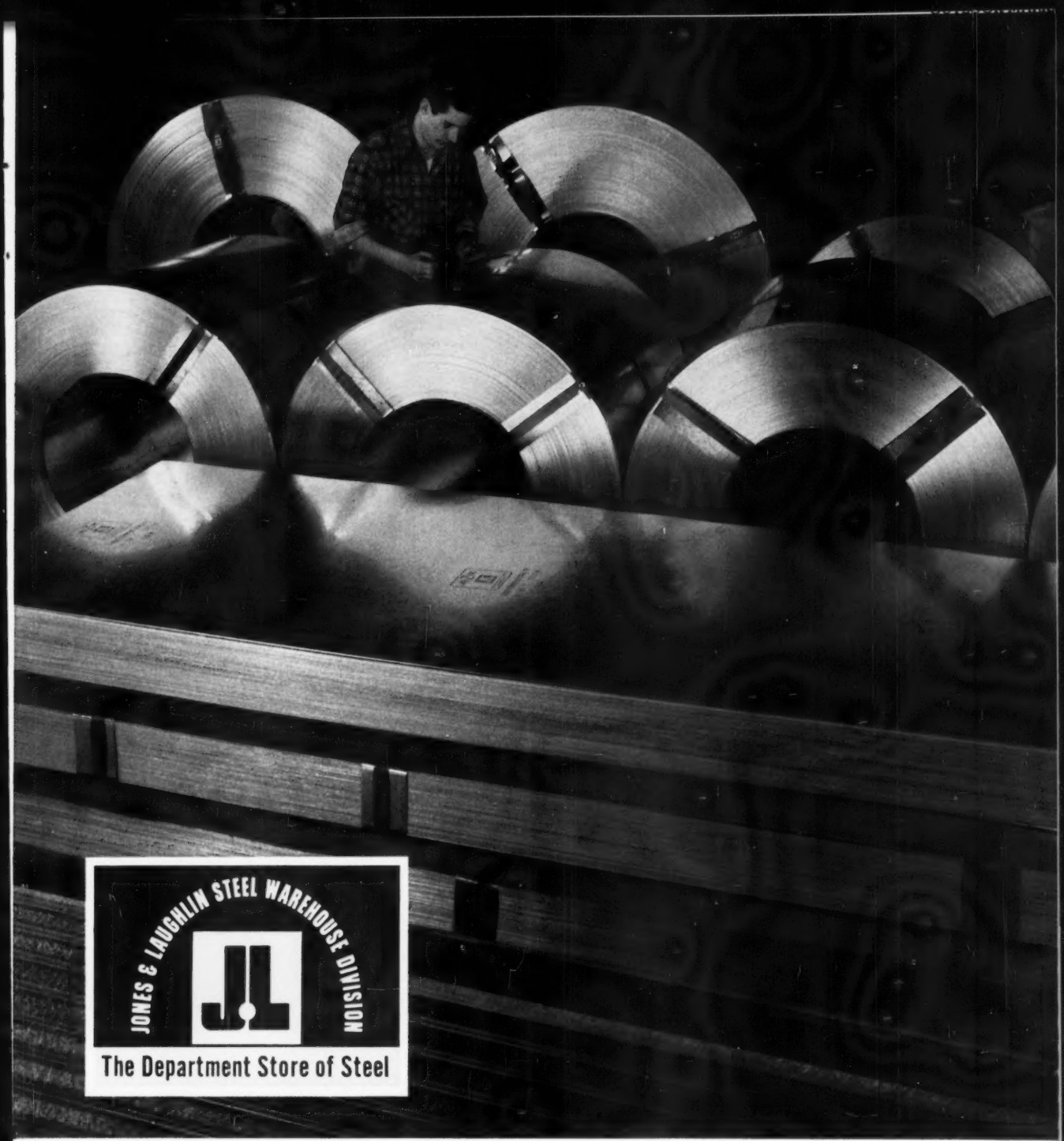
Ultrasonic equipment capable of cleaning flat and convoluted metal filter element surfaces is described in a new technical report. Pall Corp., 30 Sea Cliff Ave., Glen Cove, N. Y.

Steel Castings

"Sinews of Modern Living," 28 pages, illustrates the versatility, strength, engineering advantages, and economy of steel castings. Steel Founders' Society of America, 606 Terminal Tower Bldg., Cleveland 13, Ohio.

Electric Controls

An 8 page booklet gives descriptions and dimensions, discusses operation and selection of a line of standard, special, and custom controls used to actuate electric brakes and clutches. Warner Electric Brake & Clutch Co., Beloit, Wis.



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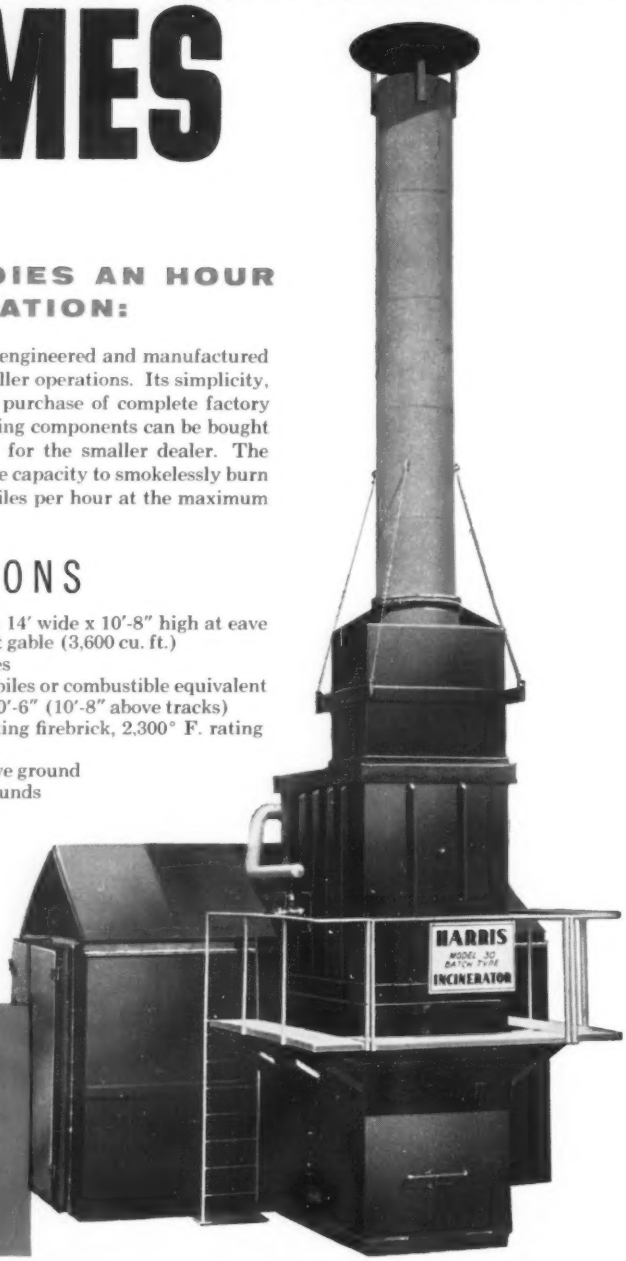
Harris Model 30 Batch Incinerator

CONTROLS SMOKE AND FUMES



HANDLES 4 AUTO-BODIES AN HOUR ...CONTINUOUS OPERATION:

This first of a complete line of incinerators being engineered and manufactured by Harris is intended to meet the needs of the smaller operations. Its simplicity, overall cost, and flexibility of installation permit purchase of complete factory built unit, or if you prefer, the major and controlling components can be bought separately. This provides an ideal arrangement for the smaller dealer. The exceptionally effective afterburner provided has the capacity to smokelessly burn all combustible matter, except tires, in 4 automobiles per hour at the maximum firing rate of 40 gallons of #2 fuel oil per hour.

SPECIFICATIONS

Kiln size	20′ long x 14′ wide x 10′-8″ high at eave 14′ at gable (3,600 cu. ft.)
Burning time	25 minutes
Hourly capacity	4 automobiles or combustible equivalent
Door openings	11′-0″ x 10′-6″ (10′-8″ above tracks)
Afterburner lining	9″ insulating firebrick, 2,300° F. rating
Stack diameter	36 inches
Stack height	35 ft. above ground
Estimated weight	55,000 pounds

Talk with a Man from Harris

HARRIS FOUNDRY & MACHINE CO.

Since 1889

CORDELE, GEORGIA

Steelmakers Warn: Prices to Rise

HIGHER steel prices are a certainty, but the timing remains in doubt.

In annual reports and recent speeches, industry leaders make it clear that they're considering a move to offset higher employment costs and protect profit margins.

One company declares pointedly that "some adjustments will eventually be necessary." Another claims that any productivity gains resulting from improved facilities and processes will be largely absorbed by additional depreciation and interest charges. Its conclusion: "The cost of making a ton of steel is going to keep on going upward. The result can only be shrinkage in the already narrow profit margins of the steel industry or an increase in the price of steel."

RISING COSTS— A rule of thumb is that a penny an hour rise in labor costs adds 40 cents to the cost of making a ton of steel. Figuring the added cost of the present contract at 40 cents an hour, the cost of making a ton of steel will be boosted $16 a ton by the time the contract expires on June 30, 1962.

IMMEDIATE IMPACT— Even though there will be no wage increase until Dec. 1, a major steelmaker estimates that fringe benefit costs will go up 14 cents an hour during the first 11 months of the contract. Does this mean that the industry will try to raise prices immediately? Probably not. Reason: It would be hard to justify an increase in the wake of record first quarter profits. Chances are there will be no across-the-board price moves until December. At that time, steelmakers can: 1. Point to comparatively poor third quarter results. 2. Cite higher wage costs, effective Dec. 1. If there are any increases in the next few months, they'll probably be selective, with some coming in the form of higher extras.

TODAY'S PROBLEMS— As they weigh future price moves, steelmakers face problems of more immediate concern:

- The stock market decline seems to have shaken confidence in the economy a little.
- Severe weather conditions hinder oil country drilling and retard the sale of products used in construction — structurals, reinforcing bars, pipe.
- The Federal Power Commission's slowness in approving pipeline projects forces gas transmission companies to hold up their orders for large diameter pipe.
- Stiff competition for business in the various metals and hard goods lines. Example: A reduction in prices on some grades of ferrochrome, attributed by market authorities to an increasingly tight competitive situation, partly due to imports. Also, downward adjustments in prices on automatic baler tie wire are cited.

AUTOMAKERS TRIM STOCKS— In Detroit, automakers have 35 to 40 day stocks of steel. Although they have traditionally carried 30 day inventories, they'll try to operate hereafter on 20 day supplies. They're not canceling steel orders, but they'll keep pushing deliveries back until they get their stocks down to the 20 day level.

INGOT RATE SLIPS— Last week, steelmakers operated their furnaces at 91.1 per cent of capacity, 2 points below the previous week's revised rate. Production was about 2,597,000 ingot tons. STEEL's composite price on the premium grade of heavy melting scrap dropped 33 cents to $34 a ton, the lowest it has been since last May.

Whether scrap has hit the bottom remains to be seen. Recent heavy purchases by the Japanese served to firm up the market, especially in the East, but domestic mill buying continues sluggish.

WHERE TO FIND MARKETS & PRICES

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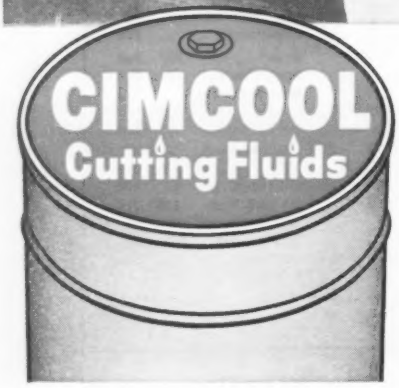
*Current prices were published in the Mar. 14 issue and will appear in subsequent issues.

"Rust Completely Under Control!"

CIMPLUS, rust-control specialist of the famous CIMCOOL family of cutting fluids, cuts special handling costs by more than $90 a week. (Company name on request).

2
SALES REPORT
firm makes textile machinery. They were having trouble grinding some cast iron and shell molded parts. Extremely high stock removal, using a soluble oil coolant.
They were experiencing (1) Considerable rancidity... (2) Unsatisfactory settling of grit and sludge...(3) Parts were rusting so badly that they needed special handling. They were dried in sawdust. Rust had to be sandblasted or worn off in tumbling machines.
We installed Cimplus at 1:75. Rancidity—Now no problem. Grit settling—Excellent. Rust—Completely under control, with no special handling needed. Cimplus is saving them better than $90 a week in labor costs alone!
George Stockwell
Boston Office
VIA AIR MAIL
BOSTON
MASS



FOR 100% OF ALL METAL CUTTING JOBS

Production-proved products of The Cincinnati Milling Machine Co.

CIMCOOL S2 Concentrate — The pink fluid which covers 85% of all metal cutting jobs.
CIMPERIAL° — Newest in the famous, industry-proven line of CIMCOOL° Cutting Fluids.
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For full information on the complete family of CIMCOOL Cutting Fluids, call your CIMCOOL Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

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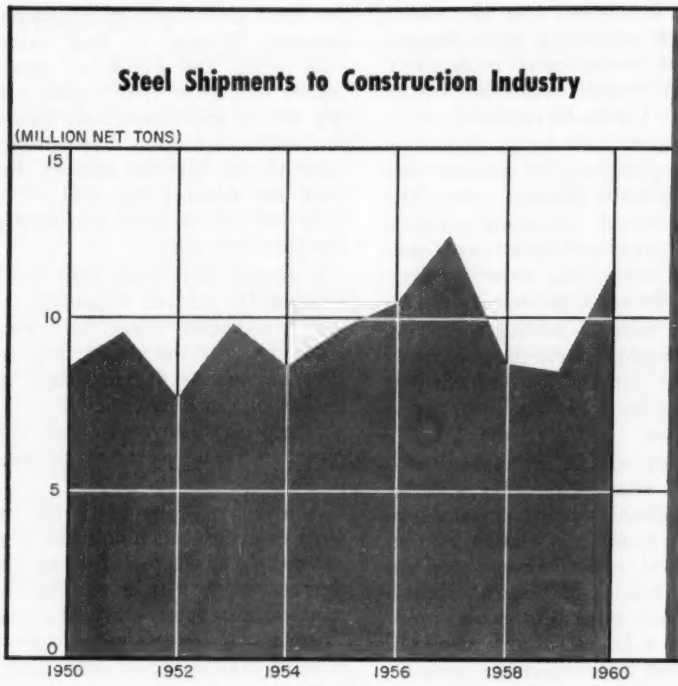

*Estimated on the basis of the same percentage take (12.5 per cent) in 1959 of the total steel mill shipment tonnage, assuming 1960 finished steel output totals 93 million net tons.

Federal Public Works Expenditures

(Millions of dollars)

	Year Starting July 1, 1960	Year Ending June 30, 1960
Highways	$2,700	$3,032
Military bases, etc.	1,354	1,662
Irrigation, flood control, power, navigation	1,209	1,057
Atomic energy plants	278	249
Air, space research facilities	206	139
Airports	112	118
Hospitals, medical research facilities	105	102
College housing	89	110
Post office improvements	80	72
Schools	71	72
Other	467	479
Totals	$6,945	$7,295

Building Outlook Stimulates Steelmen

STEELMEN are happy over construction prospects for 1960. New inquiries and awards are signaling a promising seasonal start on the year's building program, which could turn out to be among the greatest. Builders say construction expenditures in 1960 may hit a record $75.5 billion, $2.7 billion more than in 1959.

New building put in place is expected to involve expenditures of $55.3 billion; maintenance and repair, $20.2 billion. Last year's record $54 billion marked the fifteenth straight annual increase in dollar outlays for construction put in place.

• All building categories except housing are expected to register increases this year.

Industrial construction is scheduled to rise 34 per cent to $4 billion. Commercial building is expected to go up 15 per cent to $2.5 billion. Housing may drop 17 per cent (because of tight money), but will involve expenditures of $3.9 billion. Federal spending will be off a little, budgeted expenditures of almost $7 billion in fiscal 1960-61 compared with $7.2 billion in fiscal 1959-60 (see table above).

Something like 1,200,000 net tons of structural steel are scheduled for fabrication in the February through May period. Generally, 1960 fabricated structural bookings are expected to top the 3,222,858 tons reported for 1959. That spells an active year for the fabricating shops.

• But construction needs include more than structurals, running the gamut of the steel mill product list.

The range of products includes: Structurals, channels, angles, joists, plates, culvert steel, sheets, reinforcing bars, fasteners, wire and wire products, wire rope, fence posts, fence, welded wire fabric, hinged bar mats, highway guard rail, tunnel segments, castings, prestressed concrete strand, mesh, floor plates, bridge flooring, and tubular goods.

Shipments of building steel (excluding contractors' products) were 8,516,285 net tons in 1959, or 12.5 per cent of total mill tonnage. The record 12,523,285 tons moved in 1957 constituted 16 per cent of mill volume. Based on anticipated finished steel output of 93 million tons this year, building steel requirements (assuming the same percentage take as in 1959) should exceed 11 million tons (see chart).

Domestic steel tonnage would have been larger last year (despite the strike) had it not been for heavy imports. Foreign competition is noticeably severe in structurals, reinforcing bars, and wire items, as shown by this table:

Foreign Trade—1959
(Net tons)

Products	Imports	Exports
Plates	291,360	65,585
Structural shapes	766,503	225,918
Piling	10,198	14,115
Reinforcing bars	851,943	13,776
Fabricated shapes	91,119	57,739
All iron & steel products	5,515,909	2,102,970

Competition from prestressed concrete, aluminum, and some other materials is causing concern among steel fabricators. Inroads by the

newer products have been particularly noticeable since the 1957 shortage of structural steel. Since that year, over 1 million tons of structural capacity have been added, the total now exceeding 8 million tons annually.

• Building steel products are in plentiful supply, mill deliveries running five to eight weeks, and spot shipments being available from warehouses.

But contractors and engineers, in an ever tightening cost squeeze, are emphasizing lighter weight construction, more simple designs, closer estimating, and more careful planning. Less dependence on steel in some building applications will result as new construction concepts win favor.

For example, the plastic theory in steel construction (STEEL, Dec. 21, 1959, p. 101) and ultimate strength design in concrete are being spotlighted. The plastic concept takes advantage of the ductility of structural steel in continuous framing, envisaging loading beyond the point of elasticity into plastic formation. Use of smaller beams is possible, a given amount of steel doing more work than formerly thought desirable. Claimed savings: Up to 15 per cent.

Ultimate load design applies to the proportioning of concrete sections to resist internal stress. The trend toward precasting concrete members (reinforced and prestressed) is adding a new dimension in the use of concrete.

High strength bolting is growing at the expense of riveting, especially in field construction. Welding is winning favor and prefabrication is increasing.

What's ahead for construction over the next decade? One estimate: $670 billion will be expended in the U. S. on new construction in the period, more than was paid out in the previous 35 years. Even if that figure proves to be overly optimistic, a lot of building steel will be moved in the next ten years.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 218 & 219

Sheetmakers have full order books for April. Galvanized is in strongest demand, followed by long ternes, cold rolled, and hot rolled sheets. Sellers anticipate little trouble selling all the galvanized, long ternes, and cold rolled sheets they can produce in the first six months. But they say demand for cold rolled strip and silicon sheets and strip is comparatively slow.

Although there have been many requests for delayed shipments, order cancellations have been relatively few. In the main, they reflect automotive cutbacks and attempts of some other users to get off the hook of conversion steel commitments, made during the steel strike.

Automakers have markedly revised their production and steel procurement plans in recent weeks, but they're canceling little tonnage. In most cases, requests are for delayed shipments. Deferred auto tonnage is being snapped up by other users.

Demand from some appliance makers remains strong, despite mounting dealer inventories of finished goods and disappointing sales in the first two months this year.

EXECUTIVE REPORT #7

STRAIGHT-LINE DESCALING AUTOMATES WIRE AND BAR DRAWING LINES

Wheelabrator abrasive blast descaling brings new automation to wire products manufacture, with substantial savings in time and labor. Whereas batch pickling requires multiple handling operations, this mechanical descaling process involves handling coils only once or twice.

Rod can be straightened, cleaned, coated, drawn and cold headed in one continuous, straight-line operation. Single or multiple strands can be cleaned at speeds up to 600 fpm. The savings through eliminating acid pickling and multiple handling are enormous.

Take advantage of WHEELABRATOR'S engineering experience in wire descaling

Wheelabrator's unequalled experience in blast descaling of wire is at your service. Send for Bulletin 148-D illustrating the Wheelabrator automated wire drawing method. Wheelabrator Corp., 509 S. Byrkit St., Mishawaka, Ind. Canadian Division: P. O. Box 490, Scarborough, Ont.

Steel Bars . . .

Bar Prices, Page 217

Hot rolled carbon bars can be ordered for delivery in late April and early May, an indication that the market is not as tight as expected early this year. But prospects are good for a fairly active second quarter, even though consumers are ordering more cautiously.

Generally, buying is diversified. Automotive requirements are down. Neverthless, expectations are May will be an active shipping month for the barmakers. There have been some cancellations of tonnage by heavy machinery builders. To some extent, weather is to blame; equipment builders are not able to ship finished machines.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 218

Reinforcing bars are moving at a fair pace, and the flow of tonnage is expected to pick up as the building season opens. In some areas, construction of schools and industrial buildings is fairly active.

Low alloy high strength reinforcing bars are being used in some building designs and are being considered for bridge construction. European engineers have utilized this class of bars for several years, and in 1959 the American Society for Testing Materials offered three specifications covering the classification.

Distributors and fabricating shops are reported to be holding substantial backlogs, but some interests have not loaded their books heavily because of price competition. Reinforcing bars continue to be among the leading steel product imports.

Wire . . .

Wire Prices, Pages 219 & 220

Demand for wire used in construction is heavier, and volume this spring is expected to compare favorably with that a year ago. Both mat reinforcement and prestressed concrete are in demand.

Wire specialties, including high carbon grades, are less active than they were. Converters have rebuilt their stocks of rods and where processing is not too extended, shipments are again almost normal.

H. F. S. Mfg. Sales, Southgate, Calif., has booked 315 tons of round annealed carbon wire from the U. S. Engineer, Chicago.

Tubular Goods . . .

Tubular Goods Prices, Page 221

Demand for line pipe in the first half looks solid. Beyond that there is some question. Potential business for pipe seems to be there, but projects are not getting the "go ahead" fast enough to assure active demand in the last half.

Contracts have been placed for 1610 miles of 16 to 30 in. natural gas lines, mostly 24 and 30 in. The lines will extend from Oklahoma and Texas. Included is 600 miles of steel pipe for a line from Harper County, Okla., to Wisconsin-Michigan. The tonnage was awarded recently to A. O. Smith Corp., Milwaukee.

Oil drilling continues to slow down. Hughes Tool Co.'s survey showed 1656 rotary rigs operating in the week ended Mar. 7, down four from the preceding week and 191 from a year ago.

Most distributors have rebuilt their stocks but are carrying sub-

EXECUTIVE REPORT #16

HOW MANY TRIANGLES* CAN YOU FIND IN THIS STAR?

Look for the hidden value in blast cleaning abrasives, too

The "hidden values" you get in a high quality steel abrasive, like Wheelabrator Steel Shot, far outweigh any price advantage of the so-called "economy" abrasives. Wheelabrator Steel Shot is harder and tougher — lives for many more cycles through your blast equipment. It cleans better — allows shorter blast cycles. You'll get better, faster cleaning, lower maintenance, lower actual cleaning costs with top quality Wheelabrator Steel Shot. Thousands of users do. Your Wheelabrator Abrasive Engineer will prove it.

Write today for this new handbook of blast cleaning abrasive performance, full of charts and facts to help you control abrasive consumption and reduce cleaning costs. Write to Wheelabrator Corp., 509 S. Byrkit St., Mishawaka, Ind. In Canada, Wheelabrator Corp., Canadian Div., P.O. Box 490, Scarborough, Ontario.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

If you examine it closely enough, you'll find 97 triangles.

stantially less tonnage than they were a year ago. Construction requirements are mounting.

Tin Plate . . .

Tin Plate Prices, Page 219

Demand for tin plate looks good through the third quarter, but a falloff in the fourth quarter will not be surprising. By the time that period arrives, the demand for cans for the summer and fall food pack will have been accommodated. Canmakers are taking inventories into their plants slowly. They are letting the mills hold the stocks since prompt deliveries are available.

Some producers express concern that the heavy snows and cold weather may ruin some crops and delay the packing of others.

At Pittsburgh, it's reported that while canmakers depleted their stocks during the steel strike, they've since received large shipments, and inventories now are in reasonably good balance. The pressure for fast deliveries is off.

Some canmakers aren't taking all the tonnage allocated them by the mills, but order cancellations are few, and tonnage released by one customer can easily be sold to another. Export business is booming.

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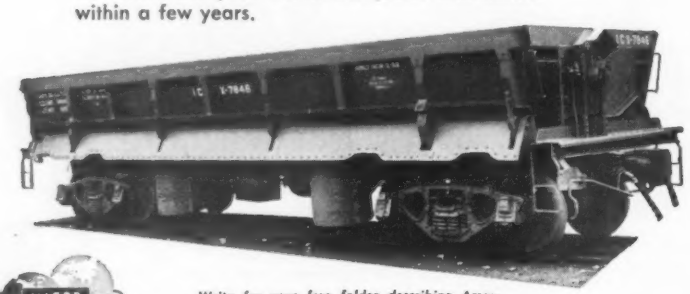

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Imported Steel Offered At Liquidation Prices

Surplus stocks of foreign steel are being offered at liquidation prices in the Houston area, but foreign mill prices are unchanged. The volume of incoming foreign steel declined sharply in February—44,000 tons vs. 70,000 in the preceding month. Continuing declines are expected until excess speculative stocks are disposed of.

Tool Steel . . .

Tool Steel Prices, Page 221

Shipments of tool steel (excluding hollow drill steel) in January amounted to 9577 net tons, after deducting 338 tons shipped to members of the industry for further conversion or resale, reports the American Iron & Steel Institute. The total compares with 9210 tons in December, and with 7,545 tons in January, 1959.

Plates . . .

Plate Prices, Page 217

Because its first quarter bookings of heavy electrical equipment have been below expectations, a leading plate consumer is canceling some orders and deferring delivery of others. Its steel consumption rate is dropping, and the mills are catching up with back orders faster than expected.

This situation is being duplicated in other areas of plate consumption. For example, builders of small underground tanks for gasoline storage and similar uses have built up moderate stocks of fabricated units for seasonal demand. Tank buyers, however, are requesting that shipments be held up until better weather prevails.

Railroad carbuilders, who until three months ago were placing substantial steel orders, have taken a more cautious buying position. They have a good volume of orders on their books, but as the business turns down a little there is the possibility the railroads may cancel or defer some orders.

Ferroalloys . . .

Ferroalloy Prices, Page 224

Stiff competition is reflected in a price reduction on all grades of low carbon ferrochrome. Increased capacity and imports have been factors in forcing the market down in recent weeks. Reductions run up to 15 per cent. Ferrochromesilicon also is reported affected. New prices on low carbon ferrochrome will be found on Page 232.

Production of silicon alloys and metal during 1959 showed a gain of 44 per cent over the 1958 total, while shipments were up 45 per cent, reports the U. S. Bureau of Mines. Production was 759,964 tons and shipments 732,425 tons. Stocks at the yearend were 123,113 tons.

A total of 45,434 tons of ferrosilicon and silicon metal was used in producing other silicon alloys during the year.

Iron Ore . . .

Iron Ore Prices, Page 223

This year's vessel freight rates for the movement of iron ore on the Great Lakes will be the same as they were in 1959. The rates, per gross ton, are:

From the head of Lake Superior to lower lake ports, $2.

From Marquette, Mich., to lower lake ports, $1.80.

From Escanaba, Mich., to Lake Erie ports, $1.50.

From Escanaba, Mich., to Chicago district ports, $1.20.

Pig Iron . . .

Pig Iron Prices, Page 222

Foundry operations continue spotty. Some shops are busy; others are operating on a short workweek schedule. Foundries serving the automotive industry have been working at a fast pace, but they anticipate some cutbacks unless new car sales improve.

Demand for merchant iron is holding on a fairly even keel. Supplies are ample to meet all needs, eliminating the necessity of stockpiling by consumers.

Blast furnace operations are being maintained at more than 95 per cent of capacity. In the Chicago district, 39 of 43 furnaces are active. U. S. Steel Corp. blew out its No. 9 stack at Gary, Ind., Mar. 4 for relining. Wisconsin Steel Div., International Harvester Co. took out its No. 2 stack at South Chicago, Ill., on Mar. 12 for relining.

An explosion last Wednesday put a blast furnace out of commission at the Aliquippa (Pa.) Works Div., Jones & Laughlin Steel Corp.

Structural Shapes . . .

Structural Shape Prices, Page 217

Structural steel business is picking up seasonally, and it looks good for the next several months. Fabricating shops report bookings and shipments are nearly in balance.

Contracts for fabricated work in New England are about 5 per cent below the year-ago pace, but prospective heavier bridge tonnage is likely to even the score by the end of this month.

There has been some reduction of overtime and extra shifts by fabricators; more shops are getting back to regular delivery schedules. New England shops have deferred some tonnage to April, but few are canceling orders on mill books.

Outstanding contracts include 10,000 tons for a bridge superstructure,

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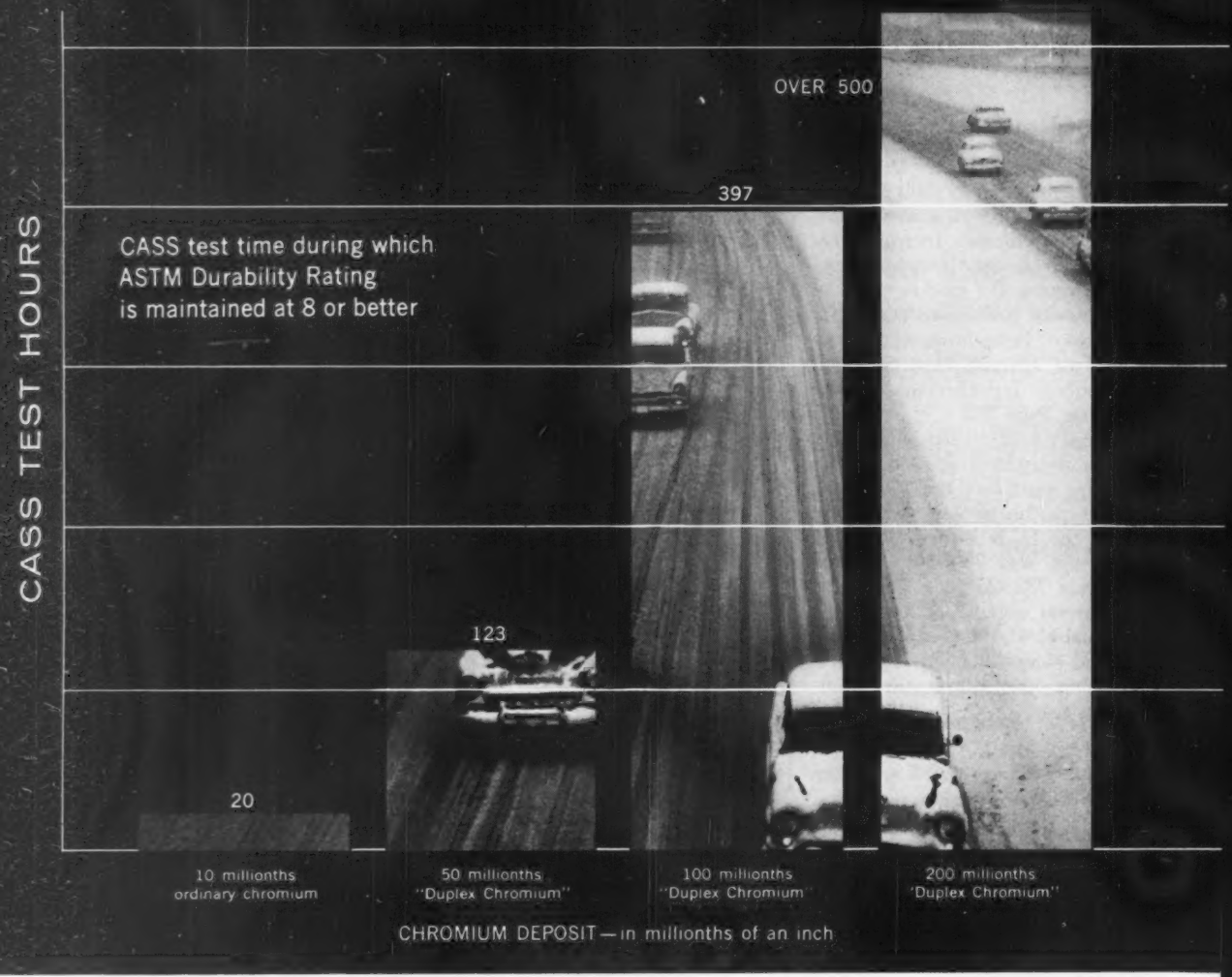
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Ohio River, Kentucky-Indiana. Isaacson Iron Works, Seattle, is low on 1200 tons for the Securities Bldg. extension in Seattle. An Italian fabricator made the low tender to the Bonneville Power Administration on 350 tons of tower steel.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

10,000 tons, superstructure, bridge over Ohio River, highway No. 64, Jefferson County, Kentucky, to Floyd County, Indiana, to R. C. Mahon Co., Detroit.

8000 tons, plant, Western Electric Co., Lee's Summit, Mo., to Allied Structural Steel Co., St. Louis.

3640 tons, courthouse and federal building, Brooklyn, N. Y., through P. J. Carlin and Atlas Tile & Marble Co., joint contractors, to a metropolitan district fabricator.

3500 tons, bank and office building, American Commercial Bank, Charlotte, N. C., to Southern Engineering Corp., Gastonia, N. C.; Southeastern, Goode, Thompson & Street Co., Charlotte, joint contractors.

2600 tons, plant and powerhouse for Fisher Body Div., General Motors Corp., Baltimore, to Ingalls Iron Works, Birmingham; the plant will require about 2200 tons and the powerhouse 400 tons. They were bid separately.

690 tons, Harverford Mental Health Center, Delaware County, Pennsylvania, through Paul Tishman Co., New York, general contractor, to Gray's Metal Iron Works, Philadelphia.

575 tons, addition, radio receiver plant, General Electric Co., Utica, N. Y., to an unnamed fabricator.

500 tons, laboratory, General Electric Co., Schenectady N. Y., to James McKinney & Son Inc., Albany, N. Y.

470 tons, Sears, Roebuck & Co., building, Spokane, Wash., to Union Iron Works, Seattle; Max Kuney Co., Spokane, general contractor.

400 tons, warehouse addition, Dixie Cup Div., American Can Co., Lexington, Ky., to the Bristol Steel & Iron Works Inc., Bristol, Va.

STRUCTURAL STEEL PENDING

1385 tons, pipe fabricating shop at Williamsport, Pa., for M. W. Kellogg Co., Jersey City, N. J.

1600 tons, hangar, Eastern Air Lines, Chicago, Malan Construction Co., New York, low on the general contract.

1200 tons, addition to Securities Building, Seattle; Isaacson Iron Works, Seattle, reported low bidder.

800 tons, welfare home, Nassau County, New York; Leon de Mattias, is low bidder on the general contract.

712 tons, state bridgework, LR-187 (12), Allegheny County, Pennsylvania, bids Mar. 25; this project was previously noted as involving 1520 tons.

February Steel Output Is Recordbreaking for Month

Steel production in February hit 11,119,000 net tons, a record for the month, reports the American Iron & Steel Institute. It compared with January's 12,049,404 tons, the all-time monthly record.

The record 23,168,404 tons produced during the first two months of this year was more than 4 million tons above the 18,920,323 tons poured in the like period of 1959.

The Steel institute's index of steelmaking for February was 167.1 (based on the average of production in 1947-49). It was 169.4 in January.

Based on the Jan. 1, 1960, capacity of 148,570,970 net tons, ingot operations averaged 94.2 per cent in February vs. 95.5 in January.

Steel Ingot Production—February, 1960

Period	OPEN HEARTH (Net tons)	BESSEMER (Net tons)	OXYGEN PROCESS (Net tons)	ELECTRIC (Net tons)	TOTAL (Net tons)	Percentage of capacity
1960						
*January ...	10,510,616	211,132	280,981	1,046,675	12,049,404	95.5
†February ..	9,714,000	216,000	245,000	944,000	11,119,000	94.2
1959						
January ...	8,280,985	120,005	186,820	729,575	9,317,385	74.3
February ...	8,541,031	128,515	176,970	756,422	9,602,938	84.8
March	10,216,474	184,892	236,595	929,784	11,567,745	92.3
1st Qtr. ...	27,038,490	433,412	600,385	2,415,781	30,488,068	83.8
April	9,884,322	195,730	237,018	964,850	11,281,920	93.0
May	10,117,968	200,887	257,325	1,024,401	11,600,581	92.5
June	9,521,053	185,794	259,731	941,056	10,907,634	89.9
2nd Qtr. ...	29,523,343	582,411	754,074	2,930,307	33,790,135	91.8
1st 6 Mo. ..	56,561,833	1,015,823	1,354,459	5,346,088	64,278,203	87.8
July	4,541,741	66,433	98,634	525,368	5,232,176	41.7
August	1,171,342	.....	.....	267,935	1,439,277	11.5
September ..	1,249,398	.....	.....	285,619	1,535,017	12.7
3rd Qtr. ...	6,962,481	66,433	98,634	1,078,922	8,206,470	22.1
9 Mo.	63,524,314	1,082,256	1,453,093	6,425,010	72,484,673	65.6
October	1,385,490	.....	.....	319,043	1,704,533	13.6
November .	6,290,659	92,361	129,794	754,793	7,267,607	59.9
December ..	10,468,534	205,666	281,451	1,033,668	11,989,319	95.6
4th Qtr. ...	18,144,683	298,027	411,245	2,107,504	20,961,459	56.3
2nd 6 Mo. ..	25,107,164	364,460	509,879	3,186,426	29,167,929	39.2
Totals	81,668,997	1,380,283	1,864,338	8,532,514	93,446,132	63.3

Note—The percentages are based on annual capacities as of Jan. 1, 1960: Open hearth, 126,621,630 net tons; bessemer, 3,396,000 net tons; basic oxygen process, 4,157,400 net tons; electric and crucible, 14,395,940 net tons. Total: 148,570,970 net tons. In 1959, the capacity tonnages were: Open hearth, 126,528,380 net tons; bessemer, 3,577,000 net tons; basic oxygen process, 4,033,160 net tons; electric and crucible, 13,495,130 net tons. Total: 147,633,670 net tons.
†Preliminary. *Revised.

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Canadian Steel Mills Maintain Record Pace

Canadian steel mills are maintaining record breaking production schedules. Officials think consumer demand will continue at a high rate throughout the first half, maybe longer.

Ingot production amounted to 131,457 tons (101.7 per cent of capacity) in the week ended Mar. 5. That compares with 130,467 tons (100.9 per cent) in the preceding week. In February, the mills poured 544,930 tons of ingot steel vs. 562,152 tons in January.

Production of pig iron was 357,427 tons in February vs. 374,523 tons in January and 282,642 in February a year ago.

Finished Steel Shipments Increase During January

Mill shipments of finished steel products in January amounted to 8,429,696 net tons, reports the American Iron & Steel Institute. The total was more than 218,000 tons above the December (1959) mark. The peak monthly figure: 9.7 million tons in June, 1959.

Record shipments of 1,878,682 net tons, nearly 23 per cent of the total mill movement, went to the automotive industry. The former record (1,795,729 tons) was set in December, 1959.

Principal products shipped during January were: Cold rolled sheets (1,591,706 net tons); hot rolled sheets (995,033); hot rolled bars, including light shapes (878,689); plates (776,097); and heavy structural shapes (572,885).

The major market classifications for steel shipments—other than automotive—were: Warehouses (1,602,481 tons); construction, including maintenance (1,000,469); containers (671,640); and machinery, industrial equipment, and tools (501,119).

Steel Product Shipments—January, 1960

(Net tons)

Products:	Carbon	Alloy	Stainless	—Total for Month— 1960	1959
Ingots	43,633	10,561	2,292	56,486	19,658
Blooms, slabs, etc.	155,352	61,111	3,192	219,655	125,869
Tube rounds	3,724	290	.....	4,014	2,078
Skelp	2,806	.....	.....	2,806	10,282
Wire rods	126,427	3,288	1,647	131,362	89,744
Total semifinished	331,942	75,250	7,131	414,323	247,631
Structurals (heavy)	564,974	7,910	1	572,885	330,333
Steel piling	45,799	.....	.....	45,799	30,139
Plates	706,098	65,436	4,563	776,097	508,896
Total shapes & plates	1,316,871	73,346	4,564	1,394,781	869,368
Rails (standard)	100,071	.....	.....	100,071	52,845
Rails (all other)	5,091	.....	.....	5,091	3,298
Joint bars	3,129	.....	.....	3,129	2,146
Tie plates	17,475	.....	.....	17,475	6,661
Track spikes	5,422	.....	.....	5,422	3,406
Wheels	26,310	.....	.....	26,310	14,389
Axles	12,356	18	.....	12,374	5,117
Total rails & accessories	169,854	18	.....	169,872	87,862
Bars (hot rolled)	667,235	206,547	4,907	878,689	623,225
Bars—reinforcing	185,040	.....	.....	185,040	134,331
Bars (cold finished)	138,685	27,090	6,180	171,955	122,783
Tool steel	1,701	7,876	.....	9,577	7,545
Total bars & tool steel	992,661	241,513	11,087	1,245,261	887,884
Standard pipe	293,871	18	.....	293,889	179,515
Oil country goods	162,883	43,395	.....	206,278	183,716
Line pipe	286,298	27	.....	286,325	221,819
Mechanical tubing	72,455	25,469	597	98,521	67,239
Pressure tubing	22,005	5,401	1,499	28,905	26,485
Total pipe & tubing	837,512	74,310	2,096	913,918	678,774
Wire—drawn	299,486	4,524	3,467	307,477	215,442
Nails & staples	42,542	.....	.....	42,542	30,381
Barbed wire	4,692	.....	.....	4,692	3,960
Woven fence	12,325	.....	.....	12,325	11,315
Bale ties, baling wire	4,685	.....	.....	4,685	7,337
Total wire & wire items	363,730	4,524	3,467	371,721	268,435
Black plate	61,778	.....	.....	61,778	50,683
Tin plate—hot dipped	32,525	.....	.....	32,525	30,304
Electrolytic tin plate	493,828	.....	.....	493,828	417,210
Total tin products	588,131	.....	.....	588,131	498,197
Sheets—hot rolled	958,616	34,973	1,444	995,033	731,017
Sheets—cold rolled	1,588,086	6,664	16,956	1,591,706	1,338,906
Sheets—galvanized	323,073	.....	.....	323,073	279,244
Elec. sheets & strip	6,770	63,970	.....	70,740	50,202
Other coated sheets	29,206	.....	.....	29,206	26,103
Strip—hot rolled	155,783	2,801	714	159,298	111,145
Strip—cold rolled	136,988	2,007	23,638	162,633	111,400
Total sheets & strip	3,178,522	110,415	42,752	3,331,689	2,648,017
Total shipments (1960)	7,779,223	579,376	71,097	8,429,696	.....
Total shipments (1959)	5,734,194	401,409	50,565	.....	6,186,168

Data from American Iron & Steel Institute.

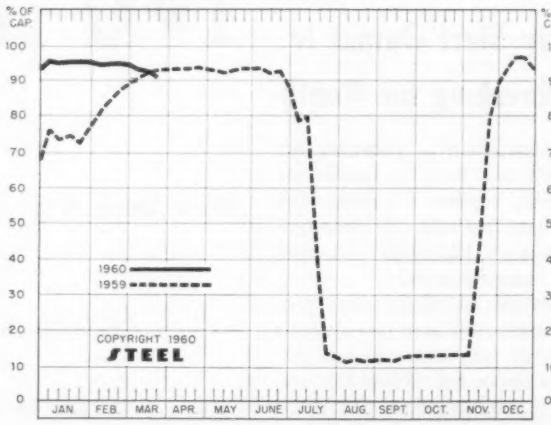
DISTRICT INGOT RATES

(Percentage of capacity utilized)

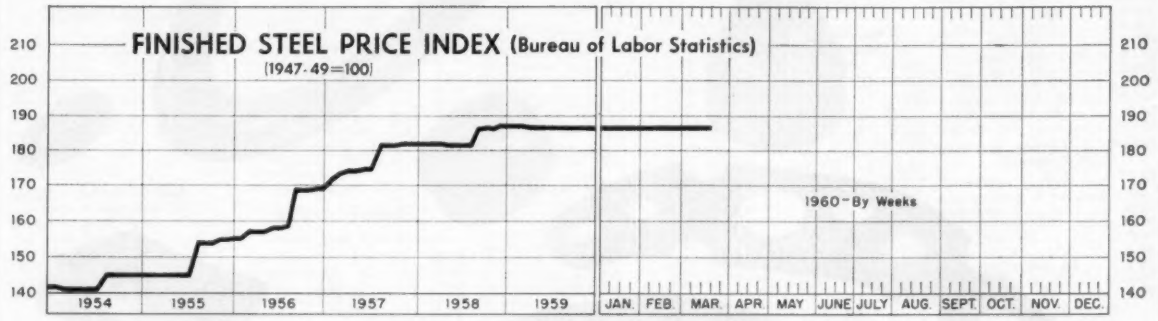
	Week Ended Mar. 20	Week Ago	Month Ago	Year Ago
Northeastern	87	87	94	97
Buffalo	99	103	98	101
Pittsburgh	94	97	95	96
Youngstown	85	86	88	87
Cleveland	102	100	102	94
Detroit	99	104	101	102
Chicago	94	98	97	94
Cincinnati	98	100	99	82
St. Louis	96	100	102	102
Southern	85	87	86	92
Western	80	82	92	86
Total Industry	91.1	93.1	93.8	92.9
Index (1947-49=100)	161.7	165.2	166.5	163.8
Net Tons (In thousands)	2,597	2,654	2,674	2,631

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Mar. 15, 1960	Week Ago	Month Ago	Feb. Index	Year Ago
186.8	186.8	186.8	186.8	186.7

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Mar. 15

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, Reinforcing	6.385
Rails, Light, 40 lb	7.292	Bars, C.F., Carbon	10.710
Tie Plates	6.875	Bars, C.F., Alloy	14.125
Axles, Railway	10.175	Bars, C.F., Stainless, 302 (lb)	0.570
Wheels, Freight Car, 33 in. (per wheel)	62.000	Sheets, H.R., Carbon	6.350
Plates, Carbon	6.350	Sheets, C.R., Carbon	7.300
Structural Shapes	6.167	Sheets, Galvanized	8.765
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Strip, C.R., Carbon	9.489
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Alloy	10.775	Strip, H.R., Carbon	6.250
Bars, H.R., Stainless, 303 (lb)	0.543	Pipe, Black, Buttweld (100 ft)	19.905
Bars, H.R., Carbon	6.675	Pipe, Galv., Buttweld (100 ft)	23.585
		Pipe, Line (100 ft)	199.533
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200	Black Plate, Canmaking Quality (95 lb base box)	7.900
Tubing, Mechanical, Carbon (100 ft)	27.005	Wire, Drawn, Carbon	10.575
Tubing, Mechanical, Stainless, 304 (100 ft)	205.608	Wire, Drawn, Stainless, 430 (lb)	0.665
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100	Bale Ties (bundles)	7.967
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800	Nails, Wire, 8d Common	9.825
		Wire, Barbed (80-rod spool)	8.766
		Woven Wire Fence (20-rod roll)	21.880

STEEL's FINISHED PRICE INDEX*

	Mar. 16 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	194.53
Index in cents per lb	6.713	6.713	6.713	6.713	5.270

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$118.23
No. 2 Fdry, Pig Iron, GT.	66.49	66.49	66.49	66.49	56.54
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	56.04
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	57.27
Steelmaking Scrap, GT	34.00	34.33	39.67	41.67	37.50

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	Mar. 16 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.30
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.30
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.55
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.40
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.25
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.26
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.53
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.225
Plates, Chicago	5.30	5.30	5.30	5.30	4.225
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.225
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.225
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.225
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.10
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.45
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	5.75
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	5.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	5.90
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	5.75
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.95	6.85
Tin plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.05

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$78.00
Wire rods, 1/2-9/16" Pitts.	6.40	6.40	6.40	6.40	4.675

PIG IRON, Gross Ton

	Mar. 16 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$57.00
Basic, Valley	66.00	66.00	66.00	66.00	56.00
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	59.66
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	58.16
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	52.88
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	60.58
Malleable, Valley	66.50	66.50	66.50	66.50	56.50
Malleable, Chicago	66.50	66.50	66.50	66.50	56.50
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$34.50	$34.50	$40.50	$44.50	$38.50
No. 1 Heavy Melt, E. Pa.	36.00	36.00	40.00	38.00	39.00
No. 1 Heavy Melt, Chicago	31.50	32.50	38.50	42.50	35.00
No. 1 Heavy Melt, Valley	36.50	36.50	43.50	45.50	37.50
No. 1 Heavy Melt, Cleve.	33.50	33.50	40.50	41.50	35.00
No. 1 Heavy Melt, Buffalo	31.50	31.50	36.50	39.50	32.50
Rails, Rerolling, Chicago	53.50	53.50	61.50	62.50	49.50
No. 1 Cast, Chicago	45.50	45.50	50.50	48.50	40.00

COKE, Net Ton

Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$13.75
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.75
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	25.25

DO YOUR MOLDED COMPONENTS GIVE YOU HEADACHES?

Compound dilemmas? Should it be Neoprene . . . Buna-N . . . VITON* . . . Silicon or Polyacrylic? How about temperature . . . below zero or sizzling? Unusual pressure conditions? . . . or perhaps a highly destructive hydraulic fluid?

If compound . . . temperature . . . pressure *or* the medium bring unusual problems to your drawing board call on IPC. Our "custom" approach to *your* application is strengthened by broad experience in the use of materials and molding techniques.

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P-2

Steel Prices

Mill prices as reported to STEEL, Mar. 16, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 218; footnotes, page 220.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ....$76.00

INGOTS, Alloy (NT)
Detroit S41 ....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 ....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 ....82.00
Munhall,Pa. U5 ....82.00
Sharon,Pa. S3 ....82.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bartonville,Ill. K4 ...$82.00
Bessemer,Pa. U5 ....80.00
Buffalo R2 ....80.00
Clairton,Pa. U5 ....80.00
Ensley,Ala. T2 ....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 ....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 .80.00
Munhall,Pa. U5 ....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ..80.00
Sterling,Ill. N15 ....80.00
Youngstown R2 ....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 ....99.50
Canton,O. R2 ....102.00
Clairton,Pa. U5 ....99.50
Conshohocken,Pa. A3 .104.50
Ensley,Ala. T2 ....99.50
Fairfield,Ala. T2 ....99.50
Farrell,Pa. S3 ....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 ....99.50
Geneva,Utah C11 ....99.50
Houston S5 ....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 ....109.00
Midland,Pa. C18 ....99.50
Munhall,Pa. U5 ....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 ....109.00
Sharon,Pa. S3 ....99.50
S.Chicago R2, U5, W14 99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 ....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 ....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3..126.00
Detroit S41 ....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 ....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 ....119.00
Houston S5 ....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 ....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 ....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 ....119.00
Owensboro,Ky. G8 ....119.00
Sharon,Pa. S3 ....119.00
S.Chicago R2,U5,W14 119.00
S.Duquesne,Pa. U5 ...119.00
Struthers,O. Y1 ....119.00
Warren,O. C17 ....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ....$122.50
Canton,O. R2 ....125.00
Cleveland R2 ....122.50
Gary,Ind. U5 ....122.50
S.Chicago,Ill. R2, W14 122.50
S.Duquesne,Pa. U5 ..122.50
Warren,O. C17 ....122.50

SKELP
Aliquippa,Pa. J5 ....5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 ....5.05
Pittsburgh J5 ....5.05
Warren,O. R2 ....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 ....6.40
Alton,Ill. L1 ....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 ....6.40
Cleveland A7 ....6.40
Donora,Pa. A7 ....6.40
Fairfield,Ala. T2 ....6.40
Houston S5 ....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 ....6.40
Joliet,Ill. A7 ....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 ....6.50
LosAngeles B3 ....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 ....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 ....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 ....6.50
Struthers,O. Y1 ....6.40
Worcester,Mass. A 7....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ..5.50
Aliquippa,Pa. J5 ....5.50
Atlanta A11 ....5.70
Bessemer,Ala. T2 ....5.50
Bethlehem,Pa. B2 ....5.55
Birmingham C15 ....5.50
Clairton,Pa. U5 ....5.50
Fairfield,Ala. T2 ....5.50
Fontana,Calif. K1 ....6.30
Gary,Ind. U5 ....5.50
Geneva,Utah C11 ....5.50
Houston S5 ....5.60
Ind.Harbor,Ind. I-2 ,Y1.5.50
Johnstown,Pa. B2 ....5.55
Joliet,Ill. P22 ....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
Los Angeles B3 ....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 ....5.50
Niles,Calif. P1 ....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 ....6.25
S.Chicago, Ill U5 W14.5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 ....5.50
Torrance, Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 ....5.55
Clairton,Pa. U5 ....5.50
Fontana,Calif. K1 ....6.45
IndianaHarbor,Ind. I-2 ..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 ....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 ....5.50
Sterling,Ill. N15 ....5.50
Weirton,W.Va. W16 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....6.90
Munhall,Pa. U5 ....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 ....8.05
Bessemer,Ala. T2 ....8.05
Bethlehem,Pa. B2 ....8.10
Clairton,Pa. U5 ....8.05
Fairfield,Ala. T2 ....8.05
Fontana,Calif. K1 ....8.85
Gary,Ind. U5 ....8.05
Geneva,Utah C11 ....8.05
Houston S5 ....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 ....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 ....8.75
Munhall,Pa. U5 ....8.05
Seattle B3 ....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 ....7.75
Struthers,O. Y1 ....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 ....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 ....8.05
S.Chicago,Ill. U5 ....8.05
Sterling,Ill. N15 ....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 ....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 ....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 ....5.30
Ashland,Ky.(15) A10 ..5.30
Atlanta A11 ....5.50
Bessemer,Ala. T2 ....5.30
Clairton,Pa. U5 ....5.30
Claymont,Del. C22 ....5.30
Cleveland J5, R2 ....5.30
Coatesville,Pa. L7 ....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 ....5.30
Fairfield,Ala. T2 ....5.30
Farrell,Pa. S3 ....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 ....5.30
Geneva,Utah C11 ....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 ....5.30
Houston S5 ....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 ....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 ....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 ....5.30
Newport,Ky. A2 ....5.30
Pittsburgh J5 ....5.30
Riverdale,Ill. A1 ....5.30
Seattle B3 ....6.20
Sharon,Pa. S3 ....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 ....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 ....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 ....7.05
Fontana,Calif. K1 ....7.85
Geneva,Utah C11 ....7.05
Houston S5 ....7.15
Johnstown,Pa. B2 ....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....14.10

PLATES, H.S. L.A.
Aliquippa,Pa. J5 ....7.95
Ashland,Ky. A10 ....7.95
Bessemer,Ala. T2 ....7.95
Clairton,Pa. U5 ....7.95
Claymont,Del. C22 ....7.95
Cleveland J5, R2 ....7.95
Coatesville,Pa. L7 ....7.95
Conshohocken,Pa. A3 ..7.95
Economy,Pa. B14 ....7.95
Ecorse,Mich. G5 ....7.95
Fairfield,Ala. T2 ....7.95
Farrell,Pa. S3 ....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 ....7.95
Geneva,Utah C11 ....7.95
Houston S5 ....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 ....7.95
Munhall,Pa. U5 ....7.95
Pittsburgh J5 ....7.95
Seattle B3 ....8.85
Sharon,Pa. S3 ....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Warren,O. R2 ....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 ....7.50
Claymont,Del. C22 ....7.50
Coatesville,Pa. L7 ....7.50
Economy,Pa. B14 ....7.50
Farrell,Pa. S3 ....7.50
Fontana,Calif. K1 ....8.30
Gary,Ind. U5 ....7.50
Houston S5 ....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 ....7.50
Lowellville,O. S3 ....7.50
Munhall,Pa. U5 ....7.50
Newport,Ky. A2 ....7.50
Pittsburgh J5 ....7.50
Seattle B3 ....8.40
Sharon,Pa. S3 ....7.50
S.Chicago,Ill. U5 W14 ..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 ....7.50

FLOOR PLATES
Cleveland J5 ....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 ....6.375
Pittsburgh J5 ....6.375
S.Chicago,Ill. U5 ....6.375

PLATES, Ingot Iron
Ashland c.l. (15) A10 ..5.55
Ashland l.c.l. (15) A10 ..6.05
Cleveland c.l. R2 ....6.05
Warren,O. R2 ....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 ....5.875
Atlanta(9) A11 ....5.875
Bessemer,Ala.(9) T2 ...5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 ....5.675
Canton,O.(23) R2 ....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 ....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ....6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 ....5.675
Houston(9) S5 ....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 ....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ...5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 ....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 ....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 ....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle A24, B3, N15 ..6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5 ..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15 .5.675
Sterling,Ill.(9) N15 ...5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 ....6.025
Youngstown(9) R2,U5 5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 ....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 ....6.725
Detroit S41 ....6.725
Economy,Pa. B14 ....6.725
Ecorse,Mich. G5 ....6.725
Fairless,Pa. U5 ....6.875
Farrell,Pa. S3 ....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 ....6.725
Houston S5 ....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 ....7.775
Lowellville,O. S3 ....6.725
Massillon,O. R2 ....6.725
Midland,Pa. C18 ....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 ....6.725
Sharon,Pa. S3 ....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 ....6.725
Warren,O. C17 ....6.725
Youngstown U5 ....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 ....8.30
Bessemer,Ala. T2 ....8.30
Bethlehem,Pa. B2 ....8.30
Clairton,Pa. U5 ....8.30
Cleveland R2 ....8.30
Ecorse,Mich. G5 ....8.30
Fairfield,Ala. T2 ....8.30
Fontana,Calif. K1 ....9.00
Gary,Ind. U5 ....8.30
Houston S5 ....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 ....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 ....9.00
Pittsburgh J5 ....8.30
Seattle B3 ....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Struthers,O. Y1 ....8.30
Youngstown U5 ....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 ....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ...5.675
Sterling,Ill. N15 ....5.775
Sterling,Ill.(1) N15 ...5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ....5.675
Atlanta A11 ....5.875
Joliet,Ill. P22 ....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 ....6.375
Pittsburgh J5 ....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 ....6.52
Seattle B3 ....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 ....6.80
Youngstown U5 ....6.80

BARS, C.F. Leaded (Including leaded extra)
Carbon
LosAngeles P2, S30 ..11.75*
Alloy
Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 ....10.35
Chicago W18 ....10.175
Elyria,O. W8 ....10.175
Monaca,Pa. S17 ....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.05c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2.7.65
Birmingham C15 ....8.25
Buffalo B5 ....7.70
Camden,N.J. P13 ....8.10
Carnegie,Pa. C12 ....7.65
Chicago W18 ....7.65
Cleveland A7, C20 ....7.65
Detroit B5, P17 ....7.85
Detroit S41 ....7.65
Donora,Pa. A7 ....7.65
Elyria,O. W8 ....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 ....7.65
GreenBay,Wis. F7 ....7.65
Hammond,Ind. J5, L2..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 ....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2.9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 ....7.65
Monaca,Pa. S17 ....7.65
Newark,N.J. W18 ....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 ....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 ....7.65
Warren,O. C17 ....7.65
Waukegan,Ill. A7 ....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 ....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 ....9.025
Camden,N.J. P13 ....9.20
Canton,O. T7 ....9.025
Carnegie,Pa. C12 ....9.025
Chicago W18 ....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 ....9.225
Detroit S41 ....9.025
Donora,Pa. A7 ....9.025
Elyria,O. W8 ....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 ....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 ....9.025
Lackawanna,N.Y. B2 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 ....9.025
Monaca,Pa. S17 ....9.025
Newark,N.J. W18 ....9.20
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20
Struthers,O. K1 ....9.025
Warren,O. C17 ....9.025

Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.675
Birmingham C15 .....5.675
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex(4)(26)T4 5.925
Gary,Ind. U5 .....5.675
Houston S5 .....5.925
Ind.Harbor,Ind. I-2,Y1 5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.925
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.925
Seattle A24, B3, N14 .6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.San Francisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.60
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 ....7.60
Lackawanna,N.Y. B2 ...7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ...7.60
Seattle A24, B3, N14 ..7.95
SparrowsPt.,Md. B2 ....7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa. (3) F5 ..5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O. (3) P11 ....5.575
Tonawanda (3) B12 ...5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ...5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ....5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif.C11 .....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14 ..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 ....6.275

SHEETS, H.R., Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2 .6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875‡
Fairfield,Ala. T2 .....6.875‡
Gary,Ind. U5 .....6.875‡
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt., Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ...7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O. (28) R2 .....7.65
Weirton,W.Va. W6 ....7.50
Youngstown J5 .....7.50

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N. Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E5 Elliott Bros. Steel Co.
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J&L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America

T2 Tenn. Coal & Iron
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala. City, Ala. (27) R2	5.10
Allenport, Pa. P7	5.10
Alton, Ill. L1	5.30
Ashland, Ky. (8) A10	5.10
Atlanta A11	5.10
Bessemer, Ala. T2	5.10
Birmingham C15	5.10
Conshohocken, Pa. A3	5.15
Detroit M1	5.10
Ecorse, Mich. G5	5.10
Fairfield, Ala. T2	5.10
Farrell, Pa. S3	5.10
Fontana, Calif. K1	5.825
Gary, Ind. U5	5.10
Ind. Harbor, Ind. I-2, Y1	5.10
Johnstown, Pa. (25) B2	5.10
Lackaw'na, N.Y. (25) B2	5.10
LosAngeles (25) B3	5.85
LosAngeles C1	8.60
Minnequa, Colo. C10	6.20
Riverdale, Ill. A1	5.10
SanFrancisco S7	6.60
Seattle (25) B3	6.10
Seattle N14	6.60
Sharon, Pa. S3	5.10
S. Chicago, Ill. W14	5.10
S. SanFrancisco (25) B3	5.85
SparrowsPoint, Md. B2	5.10
Torrance, Calif. C11	5.85
Warren, O. R2	5.10
Weirton, W.Va. W6	5.10
Youngstown U5	5.10

STRIP, Hot-Rolled Alloy

Carnegie, Pa. S18	8.40
Farrell, Pa. S3	8.40
Gary, Ind. U5	8.40
Houston S5	8.65
Ind. Harbor, Ind. Y1	8.40
KansasCity, Mo. S5	8.65
LosAngeles B3	9.60
Lowellville, O. S3	8.40
Newport, Ky. A2	8.40
Sharon, Pa. A2, S3	8.40
S. Chicago, Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland, Ky. A10	7.575
Bessemer, Ala. T2	7.575
Conshohocken, Pa. A3	7.575
Ecorse, Mich. G5	7.575
Fairfield, Ala. T2	7.575
Farrell, Pa. S3	7.575
Gary, Ind. U5	7.575
Ind. Harbor, Ind. I-2, Y1	7.575
Lackawanna, N.Y. B2	7.575
LosAngeles (25) B3	8.325
Seattle (25) B3	8.575
Sharon, Pa. S3	7.575
S. Chicago, Ill. W14	7.575
S. SanFrancisco (25) B3	8.325
SparrowsPoint, Md. B2	7.575
Warren, O. R2	7.575
Weirton, W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10	5.35
Warren, O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson, Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7, J5	7.425
Dearborn, Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover, O. G6	7.425
Evanston, Ill. M22	7.525
Farrell, Pa. S3	7.425
Follansbee, W.Va. W10	7.425
Fontana, Calif. K1	9.20
FranklinPark, Ill. T6	7.525
Ind. Harbor, Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport, Pa. E10	7.525
NewBedford, Mass. R10	7.875
NewBritain, Conn. S15	7.875
NewCastle, Pa. B4, E5	7.425
NewHaven, Conn. D2	7.875
NewKensington, Pa. A6	7.425
Pawtucket, R.I. R3	7.975
Pawtucket, R.I. N8	7.975
Philadelphia P24	7.875
Pittsburgh J5	7.425
Riverdale, Ill. A1	7.525
Rome, N.Y. (32) R6	7.425
Sharon, Pa. S3	7.425
Trenton, N.J. (31) R5	8.875
Wallingford, Conn. W2	7.875
Warren, O. R2, T5	7.425
Worcester, Mass. A7	7.975

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie, Pa. S18	15.55
Cleveland A7	15.55
Dover, O. G6	15.55
Farrell, Pa. S3	15.55
FranklinPark, Ill. T6	15.55
Harrison, N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville, O. S3	15.55
Pawtucket, R.I. N8	15.90
Riverdale, Ill. A1	15.55
Sharon, Pa. S3	15.55
Worcester, Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn, Mich. S3	10.80
Dover, O. G6	10.80
Farrell, Pa. S3	10.80
Ind. Harbor, Ind. Y1	10.80
Sharon, Pa. S3	10.80
Warren, O. R2	10.80

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie, Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn, Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover, O. G6	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. M22	8.95	10.40	12.60	15.60	....
Farrell, Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria, O. S1	10.05	10.40	12.60	15.60	....
FranklinPark, Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison, N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain, Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle, Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven, Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington, Pa. A6	9.85	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket, R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome, N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon, Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton, N.J. R5	....	10.70	12.90	15.90	18.85
Wallingford, Conn. W2	9.40	10.70	12.90	15.90	18.75
Warren, O. T5	8.95	10.40	12.60	15.60	18.55
Worcester, Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)

	0.80C	1.05C	1.35C
Bristol, Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria, O. S1	19.05	22.15	....
FranklinPark, Ill. T6	19.20	23.30	28.15
Harrison, N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer, Mass. W12	18.85	....	....
Trenton, N.J. R5	18.85	22.95	27.80
Worcester, Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

Weirton, W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Cold-Rolled Ingot Iron

Warren, O. R2	8.175

STRIP, C.R., Electrogalvanized

Cleveland A7	7.425*
Dover, O. G6	7.425*
Evanston, Ill. M22	7.525*
McKeesport, Pa. E10	7.50*
Riverdale, Ill. A1	7.525*
Warren, O. B9, S3, T5	7.425*
Worcester, Mass. A7	7.975
Youngstown S41, Y1	7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell, Pa. S3	7.50
Sharon, Pa. S3	7.50

TIGHT COOPERAGE HOOP

Atlanta A11	5.65
Farrell, Pa. S3	5.525
Riverdale, Ill. A1	5.675
Sharon, Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa, Pa. J5	$9.10	$9.35	$9.75
Fairfield, Ala. T2	9.20	9.45	9.85
Fairless, Pa. U5	9.20	9.45	9.85
Fontana, Calif. K1	9.75	10.00	10.40
Gary, Ind. U5	9.10	9.35	9.75
GraniteCity, Ill. G4	9.20	9.45	9.60
IndianaHarbor, Ind. I-2, Y1	9.10	9.35	9.75
Irvin, Pa. U5	9.10	9.35	9.75
Niles, O. R2	9.10	9.35	9.75
Pittsburg, Calif. C11	9.75	10.00	10.40
SparrowsPoint, Md. B2	9.10	9.35	9.75
Weirton, W.Va. W6	9.10	9.35	9.75
Yorkville, O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa, Pa. J5 (21-27 Ga.)	....	7.90	8.10	....
IndianaHarbor, Ind. Y1 (20-27 Ga.)	....	7.90	....	....
Niles, O. R2 (20-27 Ga.)	....	7.90	8.10	8.30

TIN PLATE, Hot Dipped

Comon Coke	1.25 lb	1.50 lb
Aliquippa, Pa. J5	$10.40	$10.65
Fairfield, Ala. T2	10.50	10.75
Fontana, Calif. K1	11 05	11.30
Gary, Ind. U5	10.40	10.65
Ind. Harb. Y1	10.40	10 65
Irvin, Pa. U5	10 40	10 65
Pitts. Calif. C11	11.05	11.30
Sp. Pt., Md. B2	10.40	10 65
Weirton, W. Va. W6	10.40	10.65
Yorkville, O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa, Pa. J5	$8.20
Fairfield, Ala. T2	8.30
Fairless, Pa. U5	8.30
Fontana, Calif. K1	8.85
Gary, Ind. U5	8.20
GraniteCity, Ill. G4	8.30
Ind. Harbor, Ind. I-2, Y1	8.20
Irvin, Pa. U5	8.20
Niles, O. R2	8.20
Pittsburg, Calif. C11	8.85
SparrowsPoint, Md. B2	8.20
Weirton, W. Va. W6	8.20
Yorkville, O. W10	8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa, Pa. J5	7.85
Gary, Ind. U5	7.85
GraniteCity, Ill. G4	7.95
Ind. Harbor, Ind. Y1	7.85
Irvin, Pa. U5	7.85
Yorkville, O. W10	7.85

MANUFACTURING TERNES (Special Coated, Base Box)

Gary, Ind. U5	$10.05
Irvin, Pa. U5	10.05

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom, W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge, Pa. A4	....	....	12.40	13.55	14.65
GraniteCity, Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor, Ind. I-2	9.875*	11.20*	11.90*	13.06*	....
Mansfield, O. E6	9.875*	11.70	12.40	13.55	14.65
Newport, Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles, O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift, Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren, O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville, O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Vandergrift, Pa. U5	8.10
Mansfield, O. E6	8.10
Warren, O. R2 (Silicon Lowcore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom, W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift, Pa. U5	15.70	16.30	16.80	17.85
Zanesville, O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge, Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler, Pa. A10	....	....	....	19.70	20.20	20.70	....
Vandergrift, Pa. U5	..	17.10	18.10	19.70	20.20	20.70	15.70
Warren, O. R2	....	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity, Ala. R2	8.00
Aliquippa, Pa. J5	8.00
Alton, Ill. L1	8.20
Atlanta A1	8.00
Bartonville, Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville, Ind. M8	8.10
Donora, Pa. A7	8.00
Duluth A7	8.00
Fairfield, Ala. T2	8.00
Fostoria, O. (24) S1	8.10
Houston S5	8.25
Jacksonville, Fla. M8	8.35
Johnstown, Pa. B2	8.00
Joliet, Ill. A7	8.00
KansasCity, Mo. S5	8.25
Kokomo, Ind. C16	8.10
LosAngeles B3	8.95
Minnequa, Colo. C10	8.25
Monessen, Pa. P7, P16	8.00
Palmer, Mass. W12	8.30
Pittsburg, Calif. C11	8.95
Portsmouth, O. P12	8.00
Rankin, Pa. A7	8 00
S Chicago, Ill. R2	8.00
S. SanFrancisco C10	8.95
SparrowsPoint, Md. B2	8.10
Sterling, Ill. (1) N15	8.00
Sterling, Ill. N15	8.10
Struthers, O. Y1	8.00
Waukegan, Ill. A7	8.00
Worcester, Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria, O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville, Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora, Pa. A7	12.65
Duluth A7	12.65
Johnstown, Pa. B2	13 40
KansasCity, Mo. U3	12.90
Minnequa, Colo. C10	12.775
Monessen, Pa. P7, P16	12.65
Muncie, Ind. I-7	13 60
NewHaven, Conn. A7	12 95
Palmer, Mass. W12	13.70
Pittsburg, Calif. C11	13.45
Portsmouth, O P12	12 65
Roebling, N.J R5	12.95
SparrowsPt., Md. B2	13.50
Struthers, O Y1	13 40
Trenton, N.J. A7	12.95
Waukegan, Ill. A7	12.65
Worcester, Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa, Pa. J5	9.75
Alton, Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9 75
Donora, Pa. A7	9.75
Duluth A7	9.75
Johnstown, Pa. B2	9.75
KansasCity, Mo. S5, U3	10.00
Kokomo, Ind. C16	*9.85*
LosAngeles B3	10 70
Minnequa, Colo. C10	9.95
Monessen, Pa. P7, P16	9.75
NewHaven, Conn. A7	10.05
Palmer, Mass. W12	10.05
Pittsburg, Calif. C11	10.70
Portsmouth, O. P12	9.75
Roebling, N.J. R5	10.05
S. Chicago, Ill. R2	9.75
S. SanFrancisco C10	10.70
SparrowsPt., Md. B2	9.85
Struthers, O. Y1	9.75
Trenton, N.J. A7	10.05
Waukegan, Ill. A7	9.75
Worcester, Mass. A7, J4, T6	10.05

WIRE, Fine & Weaving (8" Coils)

Alton, Ill. L1	16.50
Bartonville, Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville, Ind. M8	16.40
Fostoria, O. S1	16.30
Houston S5	16.55
Jacksonville, Fla. M8	16.65
Johnstown, Pa. B2	16.30
KansasCity, Mo. S5	16.55
Kokomo, Ind. C16	16.30
Minnequa, Colo. C16	16.55
Monessen, Pa. P16	16.30
Muncie, Ind. I-7	16.50
Palmer, Mass. W12	16.60
S SanFrancisco C10	17.15
Waukegan, Ill. A7	16.30
Worcester, Mass. A7, J6	16.60

WIRE, Tire Bead

Bartonville, Ill. K4	17.15
Monessen, Pa. P16	17.15
Roebling, N.J. R5	17.65

ROPE WIRE (A)

Bartonville, Ill. K4	13.45
Buffalo W12	13.45
Fostoria, O. S1	13.45
KansasCity, Mo. U3	13.70
Johnstown, Pa. B2	13.45
Monessen, Pa. P7	13.45
Muncie, Ind. I-7	13.65
Palmer, Mass. W12	13.75
Portsmouth, O. P12	13.45
Roebling, N.J. R5	13.75
St. Louis L8	13.45
SparrowsPt., Md. B2	13.55
Struthers, O. Y1	13.45
Worcester, Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

Wire, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	177
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	*$8.78*
Atlanta A11	10.36
Bartonville,Ill. K4	*8.88*
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	9.34
Donora,Pa. A7	*8.78*
Duluth A7	*8.78*
Fairfield,Ala. T2	*8.78*
Houston S5	10.51
Jacksonville,Fla. M8	9.34
Johnstown,Pa. B2	*8.78*
Joliet,Ill. A7	*8.78*
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	*9.44*
Minnequa,Colo. C10	9.49
Pittsburg,Calif. C11	*9.44*
S.Chicago,Ill. R2	*8.78*
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	*8.88*
Sterling,Ill.(37) N15	*8.88*

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	*$9.06*
Atlanta A11	10.70
Bartonville,Ill. K4	*9.16*
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.64
Donora,Pa. A7	*9.06*
Duluth A7	*9.06*
Fairfield,Ala. T2	*9.06*
Houston S5	10.85
Jacksonville,Fla. M8	9.64
Johnstown,Pa. B2	*9.06*
Joliet,Ill. A7	*9.06*
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	*9.75*
Minnequa,Colo. C10	9.79
Pittsburg,Calif. C11	*9.75*
S.Chicago,Ill. R2	*9.06*
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	*9.16*
Sterling,Ill.(37) N15	*9.16*

Coil No. 6500 Interim

AlabambaCity,Ala. R2	*$9.11*
Atlanta A11	10.75
Bartonville,Ill. K4	*9.21*
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.69
Donora,Pa. A7	*9.11*
Duluth A7	*9.11*
Fairfield,Ala. T2	*9.11*
Houston S5	10.90
Jacksonville,Fla. M8	9.69
Johnstown,Pa. B2	*9.11*
Joliet,Ill. A7	*9.11*
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	*9.80*
Minnequa,Colo. C10	9.84
Pittsburg,Calif. C11	*9.80*
S.Chicago,Ill. R2	*9.11*
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	*9.21*
Sterling,Ill.(37) N15	*9.21*

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193*
Aliquippa,Pa. J5	190§
Atlanta A11	198§
Bartonville,Ill. K4	*199*
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	196**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa. 9-11½ga. J5	190§
Atlanta A11	192§
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE (16 gage)	An'ld Galv. Stone	Stone
Ala.City,Ala. R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Cleveland A7	17.85	
Craw'dville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	
Kokomo C16	*17.95*	*19.50†*
Minnequa C10	18.10	19.65**
P'lm'r,Mass. W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran.C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	

WIRE, Merchant Quality (6 to 8 gage)

	An'ld Galv.
Ala.City,Ala. R2	9.00 9.55**
Aliquippa J5	8.65 9.325§
Atlanta(48) A11	9.10 9.775§
Bartonville(48) K4	9.85 19.90
Buffalo W12	9.00 9.55†
Cleveland A7	9.00
Crawfordsville M8	9.10 9.80††
Donora,Pa. A7	9.00 9.55†
Duluth A7	9.00 9.55†
Fairfield T2	9.00 9.55†
Houston(48) S5	9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80‡‡
Johnstown(48) B2	9.00 9.675§
Joliet,Ill. A7	9.00 9.55†
KansasCity(48) S5	9.25 9.80**
Kokomo(48) S16	9.10 9.65†
LosAngeles B3	9.95 10.625§
Minnequa C10	9.25 9.80**
Monessen(48) P7	8.65 9.35§
Palmer,Mass. W12	9.30 9.85†
Pitts.,Calif. C11	9.95 10.50†
Rankin,Pa. A7	9.00 9.55†
S.Chicago R2	9.00 9.55**
S.SanFran. C10	9.95 10.50**
Spar'wsPt.(48) B2	9.10 9.775§
St'ling(37)(48) N15	9.10 9.80
Struthers,O. Y1	9.00 9.65†
Worcester,Mass. A7	9.30 9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Consumer discounts, per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nuts 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, standard stock sizes:

Plain Finish	50
Hot Galvanized and zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only—for package or bulk quantities use applicable list less bulk discounts.

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

CAP AND SETSCREWS, Fillister Head, Cap Screws, Coarse Thread:

Packages	+55
Bulk	+16
Flat Head Cap Screws: ¾ in. and smaller, 6 in. and shorter:	
Packages	+85
Bulk	+38
Setscrews, Square Head, Cup Point, Coarse Thread: Through 1 in. diam, 6 in. and shorter:	
Packages	+ 5
Bulk	+19
Through 1 in. diam., longer than 6 in.:	
Packages	+29

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85
⅞ in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Alton,Ill. L1	$28.95	$43.40	$55.40	$73.00	$95.10
Buffalo W12	28.95	43.40	55.40	73.00	95.10
Clevel nd A7	28.95	43.40	55.40	73.00	....
KansasCity,Mo. U3	29.85	43.00	55.40	73.00	95.10
Monessen,Pa. P16	32.15	48.20	61.55	81.10	105.65
N wHaven,Conn. A7	28.95	43.40	55.40	73.00	95.10
Pittsburg,Calif. C11	28.95	43.40	55.40	73.00	95.10
Minnequa,Colo. C10	28.95	43.40	55.40	73.00	95.10
Roebling,N.J. R5	28.95	43.40	55.40	73.00	95.10
SparrowsPoint,Md. B2	28.95	43.40	55.40	73.00	95.10
St. Louis L8	28.95	43.40	55.40	73.00	95.10
Waukegan,Ill. A7	28.95	43.40	55.40	73.00	95.10

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.60	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	6.875

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

SCREW SPIKES

Lebanon,Pa. B2	15.10

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 6.295c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds, 9.65c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.72		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	H.R. Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	35.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	31.25	42.00	43.75	47.00	49.50	45.75	55.00	55.00
304L	....	....	49.75	51.50	54.75	57.25	53.50	62.75	62.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.25	75.75	71.75	80.75	80.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.00	65.50
330	....	....	123.25	....	113.00	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp., American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co., Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates—Carbon Base 5%	10%	15%	20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	48.90	59.55	70.15	80.55	....
Nickel	41.65	51.95	63.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	$36.80	$44.20

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	V-Cr Hot Work (H-13)	0.550
Spec. Carbon (W-1)	0.385	W-Cr Hot Work (H-12)	0.530
Oil Hardening (O-1)	0.505	W Hot Wk. (H-21)	1.425-1.44
V-Cr Hot Work (H-11)	0.505	Hi-Carbon-Cr (D-11)	0.955

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1 R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKees Rocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Everett, Mass. E1	67.50	68.00	68.50	....
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	....	62.50‡	66.50	....
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% Silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles, Tenn. T3 (Phos. 0.035% max)	$73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075%)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max).	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Seattle, 10,000 lb and in San Francisco, 2000 to 4999 lb. City delivery charges are 15 cents per 100 lb except: Denver, Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Birmingham, Chattanooga, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Baltimore	8.53	10.00	10.06	....	10.94	9.33	11.80	16.38	9.92	9.15	10.50
Birmingham	9.43	10.20	10.46	....	10.41	9.09	13.14	16.76	9.00	9.29	10.90
Boston	10.42	11.17	11.77	53.50	12.07	10.24	13.35	16.59	10.62	10.32	12.00
Buffalo	8.80	9.95	11.15	55.98	10.65	9.00	11.45	16.30	9.65	9.00	10.85
Charlotte, N. C.	10.81	11.22	11.34	....	12.29	10.97	12.68	....	11.38	11.17	12.18
Chicago	8.54	10.20	10.95	53.00	10.20	8.64	10.65	15.95	9.13	8.47	10.26
Cincinnati	8.71	10.26	11.00	53.43	10.52	8.96	11.53	16.27	9.69	8.85	10.59
Cleveland	8.73	9.88	11.14	52.33	10.51	8.96	11.25	16.06	9.75	8.92	10.56
Dallas	10.07	10.81	12.50	....	11.68	9.53	12.98	16.95	9.74	9.87	11.52
Detroit	8.80	10.46	11.30	56.50	10.57	8.95	11.01	16.23	9.65	8.84	10.52
Houston	9.67	10.41	12.19	52.00	11.28	9.13	13.10	16.55	9.34	9.47	11.12
Indianapolis	8.98	10.64	11.39	....	10.64	9.08	11.09	16.39	9.57	8.91	10.70
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	9.95	11.55	12.20	57.60	11.55	9.75	14.20	17.35	10.00	10.00	11.85
Milwaukee	8.68	10.34	11.09	....	10.34	8.78	10.89	16.09	9.35	8.61	10.40
New York	9.36	10.13	11.35	53.08	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	9.10	10.00	10.89	52.17	11.10	9.50	11.95	16.38	9.85	9.55	10.55
Pittsburgh	8.73	9.88	11.03	52.33	10.49	8.85	11.25	15.95	9.36	8.68	10.32
St. Louis	8.64	10.58	11.33	....	10.30	8.75	11.28	16.33	9.25	8.58	10.37
St. Paul	9.00	9.59	10.74	....	10.66	9.12	11.49	16.54	9.63	8.95	10.49
San Francisco	10.90	11.85	11.55	55.10	12.15	10.65	15.10	17.25	10.85	10.90	12.90
Seattle	11.55	12.30	12.50	56.52	12.65	11.10	16.20	17.80	11.20	11.00	13.10
Spokane, Wash.	11.55	12.30	12.50	57.38	13.15	11.60	16.20	17.80	11.20	11.00	13.60

Specifications: Hot rolled sheet, sheared edge, 10 Ga. x 36 x 96-120 in.; cold rolled sheets, 20 Ga. x 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, ¾ in.—2 15/16 in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, ¼ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 Per Cent: St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 Per Cent: St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313, Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 Per Cent: St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill. $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅝ in. grains with fines: Baltimore, $73.

*—9 in. x 4½ x 2.50 straights.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid $28-$28.50; barge, Brownsville, Tex., $30-$31.

Ores

Lake Superior Iron Ore

(Prices effective at start of the 1959 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1959, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, concentrates	nom.

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	21.00†
Brazilian iron ore, 68.5%	21.00

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.00-19.50
Domestic, concentrates, f.o.b. milling points	22.00-23.00

*Before duty. †Nominal.

Manganese Ore

Mn 46-48%, Indian, 88-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.00†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

50-55%	$2.50-2.75
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

†Nominal.

Canadian Steel

(Cents per pound, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon, Forging Quality (net ton)	$97.00
Alloy (net ton)	115.00
Wire Rods:	
Carbon, 7/32" to under ¼ in.	5.30
Carbon, ¼ in. to 47/64 in.	5.70
Alloy	6.40
Wire (carload lots)	8.40
Bars & Small Shapes:	
Carbon, merchant quality	5.40
Carbon, special quality	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Structural Size Angles & Zees	5.40
Plates:	
Carbon	5.45
Sheets & Coils, Hot Rolled:	
Carbon Sheets	5.00
Carbon Strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon Sheets	6.35
Carbon Strip (0.080 and lighter)	6.35
Carbon Strip (0.081 and heavier)	6.65
Sheets & Coils, Galvanized:	
Standard Quality	6.70
Culvert Quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field Grade	9.00
Armature Grade	9.50
Electrical Grade	10.15
Tin Mill Products (Per Base Box; 100 lb basis wt)	
Coke Tin Plate (1.25 lb pot yield)	$10.60
Electrolytic Tin Plate (0.25 lb coating)	9.10
Black Plate	8.30
Nails, c.l. lots, 400 keg min. (per keg)	$8.15

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. truckiots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron, Melting stock, 99.87% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 240 tons price is 22.75c)	
Annealed, 99.5% Fe	36.75
Unannealed (99+% Fe)	33.25
Unannealed (99+% Fe) (minus 325 mesh)	58.25
Powder Flake (minus 16 plus 100 mesh)	29.25
Carbonyl Iron: 98.1-98.9%, 3 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 500-lb drum freight allowed, c.l. 38.50; ton lots 40.50	
Antimony, 500-lb lots	42.00*
Brass, 5000-lb lots	35.10-52.20†
Bronze, 5000-lb lots	53.10-52.70†
Copper, electrolytic	14.25*
Copper, reduced	14.25*
Lead	7.50*
Manganese, Electrolytic: Minus 35 mesh	$1.00
Nickel	$1.15
Nickel-Silver, 5000-lb lots	60.70-69.00†
Phosphor-Copper, 5000-lb lots	66.00
Copper (atomized) 5000-lb lots	46.50-64.50
Solder	7.00*
Silicon	70.00*
Stainless Steel, 304	89.00*
Stainless Steel, 316	$1.07
Tin	14.00*
Zinc, 5000-lb lots	21.20-34.40‡
Tungsten: Carbon reduced, 98.8% min., minus 65 mesh	Dollars nom.**
Chromium electrolytic 99.8% Cr, min., metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §Cutting and scarfing grade. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry Coke

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens: New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.19
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.68
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.15 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.95	$6.00	$5.85	$5.70	$6.10
Bar Size Angles	5.95	6.00	5.85	5.75	6.10
Structural Angles	5.88	5.91	5.76	5.66	6.01
I-Beams	5.86	5.91	5.76	5.66	6.01
Channels	5.86	5.91	5.76	5.66	6.01
Plates (basic bessemer)	5.98	6.03	5.88	5.78	6.13
Sheets, H.R.	7.50	7.55	7.40	7.30	7.65
Sheets, Galvanized, 20 Ga., 36 in. x 96 in.	9.70	9.75	9.60	9.50	9.85
Sheets, Galv. (in coils) 20 Ga., 48 in. wide	9.80	9.85	9.70	9.60	9.95
Sheets, C.R. (drawing quality)	10.70	10.75	10.60	10.50	10.85
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	25.08	24.20	24.42	24.15	25.47
Barbed Wire (†)	6.50	6.55	6.40	6.30	6.65
Merchant Bars	6.39	6.44	6.29	6.19	6.54
Hot-Rolled Bands	7.90	7.95	7.80	7.70	8.05
Wire Rods, Thomas Commercial No. 5	6.60	....	6.45	6.45	6.70
Wire Rods, O. H.	7.05	....	6.90	6.90	7.15
Bright Common Wire Nails (§)	7.95	8.00	7.85	7.75	8.10

†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	5.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per net ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa. 21-23% Mn, $102.50, 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net tons, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of aloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35 less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: No. 1 (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c.

Blocking Chrome: No. 1 (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c; No. 2 (Cr 58-63%, C 5-6%, Si 8-10%), 23.00c; No. 3 (Cr 58-63%, C 5-6%, Si 10-12%), 23.00c.

Refined Charge Chrome: No. 1 (Cr 50-55%, C 5% max, Si 2% max), 25.00c; No. 2 (Cr 56-60% C 5% max, Si 2% max), 25.00c.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 31.50c per lb contained Cr; 0.010% max, 32.50c. Delivered.
Cr 67-71%, carload, lump, bulk, 0.025% max, 34.50c; 0.05% max, 33.50c; 0.10% max, 33.25c; 0.20% max, 33.00c; 0.50% max, 32.75c; 1.0% max, 32.50c; 1.5% max, 32.25c; 2.0% max, 32.00c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy carload packed, 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 26.25c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 28.25c per lb contained Cr. 14.60c per lb contained Si; 0.75 in. x down. 29.40c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot, packed, 2" x D plate (about ¼" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 79, 50c, freight allowed.
Vanadium Oxide: Contract, less carload lot packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al 40%, Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy: ton lot, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-15% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3% lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l., packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ⅝ lb of Si). C.l. bulk 14c per lb of briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained. f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 40% approx, Ta 20% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carlot bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

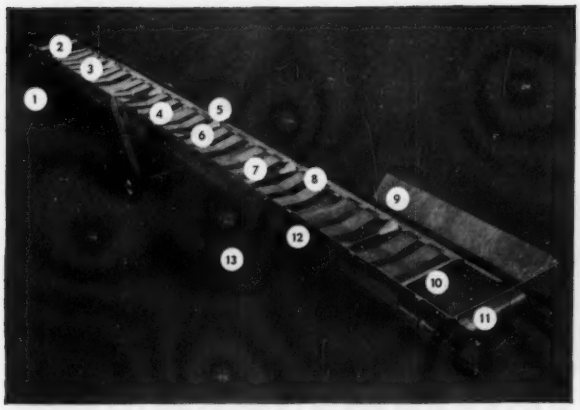
V-S Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk 19.25c. Packed c.l. 20.25c, 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Sigio, Tenn., $120 per gross ton.

Ferromolybdenum: (55-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans, $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.



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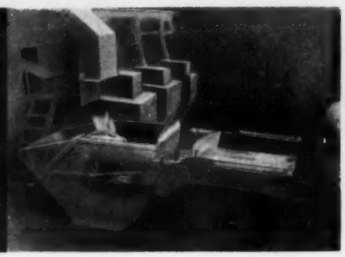

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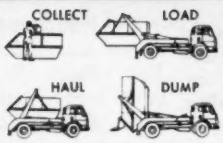

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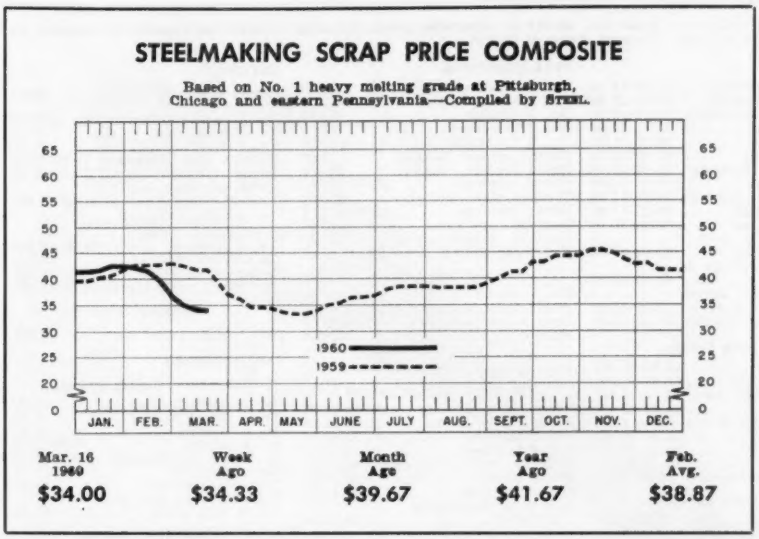

Scrap Prices Under Less Pressure

STEEL's composite on No. 1 heavy melting grade drops another 33 cents a ton to $34, lowest since May, 1959, but the downtrend has definitely slowed down

Scrap Prices, Page 228

• **Chicago**—For the first time in several weeks, scrap prices are holding virtually unchanged, but they are largely nominal, with trading in dealer material at a standstill. High level steelmaking operations are supported chiefly by blast furnace hot metal and earmarked scrap returned from industrial plants.

• **Pittsburgh**—Except for spot tonnage purchases, the market is dead. On the last mill purchase, a small quantity of No. 1 heavy melting went for $35. Buyers could have bought more at that price if bad weather had not retarded collections. One mill is offering brokers $33 for No. 1 heavy melting, but it's finding few takers.

• **Philadelphia**—Domestic demand is dull, but slightly better export buying has firmed up prices on the major steel grades. However, there has been a drop of $1 on electric furnace bundles to $39, delivered, and on low phos structurals and plate to $39-$40. Couplers, springs, and wheels are off $2 to $45, while rail crops have dropped to $60-$62. In the cast grades, heavy breakable is lower at $43, as is drop broken machinery at $51-$52.

• **New York**—Modest export buying has steadied the steel scrap market here. The only changes noted in brokers' buying prices are a drop of $1 a ton in heavy breakable cast to $34-$35 and a $5 decline in 430 stainless sheets, clips, and solids to $80-$85.

• **Cleveland**—The market is leveling out, following the recent sharp price decline, but trade opinion is split as to whether the bottom has been hit. Some observers think slackening ingot operations (the Valley rate was off 1 point last week) and a likely seasonal pickup in collections will lead to further easing in prices. Brokers in the Valley are filling old commitments with material picked up at the most favorable prices they can develop. A recent sale of No. 1 industrial scrap at $38 to a Valley steelmaker dealt a body blow to the market in that area.

• **Detroit**—The market is slow, but prices are steady. Brokers and dealers expect few changes over the next month. Only minor orders are now being filled. No. 2 bundles are now quoted $15-$16. The cast iron grades are also unchanged, though there is little demand from the foundries.

• **Buffalo**—The movement of scrap has fallen off here since the recent price reduction. Over-the-scale receipts are down, and numerous small collectors are withdrawing

(*Please turn to Page 233*)

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Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, Mar. 16, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Mar. 16	$34.00
Mar. 9	34.33
Feb. Avg.	38.87
Mar. 1959	40.40
Mar. 1955	37.50

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	28.00-29.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	24.00-25.00
No. 1 busheling	34.00-35.00
No. 1 factory bundles	43.00-44.00
Machine shop turnings	17.00-18.00
Mixed borings, turnings	17.00-18.00
Short turnings	24.00-25.00
Cast iron borings	24.00-25.00
Cut structurals:	
2 ft and under	42.00-43.00
3 ft and under	41.00-42.00
Heavy turnings	31.00-32.00
Punchings & plate scrap	46.00-47.00
Electric furnace bundles	44.00-45.00

Cast Iron Grades

No. 1 cupola	50.00-51.00
Stove plate	46.00-47.00
Unstripped motor blocks	32.00-33.00
Clean auto cast	47.00-48.00
Drop broken machinery	55.00-56.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
Rails, 2 ft and under	58.00-59.00
Rails, 18 in. and under	59.00-60.00
Random rails	53.00-54.00
Angles, splice bars	47.00-48.00
Railroad specialties	44.00-45.00
Rails, rerolling	64.00-65.00

Stainless Steel Scrap

18-8 bundles & solids	225.00-230.00
18-8 turnings	120.00-125.00
430 bundles & solids	125.00-130.00
430 turnings	55.00-65.00

CHICAGO

No. 1 hvy melt., indus.	*32.00-33.00*
No. 1 hvy melt., dealer	30.00-31.00
No. 2 hvy melting	26.00-27.00
No. 1 factory bundles	34.50-35.50
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	19.00-20.00
No. 1 busheling, indus.	*32.00-33.00*
No. 1 busheling, dealer	30.00-31.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	38.00-39.00
Punchings & plate scrap	40.00-41.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Stove plate	42.00-43.00
Unstripped motor blocks	39.00-40.00
Clean auto cast	53.00-54.00
Drop broken machinery	53.00-54.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
R.R. malleable	55.00-56.00
Rails, 2 ft and under	*52.00-53.00*
Rails, 18 in. and under	*53.00-54.00*
Angles, splice bars	45.00-46.00
Axles	51.00-52.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles, solids	210.00-215.00
18-8 turnings	110.00-115.00
430 bundles & solids	115.00-120.00
430 turnings	55.00-60.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	17.00-18.00
No. 1 bundles	31.00-32.00
No. 2 bundles	*15.00-16.00*
No. 1 busheling	28.00-29.00
Machine shop turnings	12.00-13.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	10.00-11.00

Cast Iron Grades

No. 1 cupola	40.00-41.00
Stove plate	34.00-35.00
Heavy breakable	34.00-35.00
Unstripped motor blocks	26.00-27.00
Charging box cast	34.00-35.00
Clean auto cast	47.00-48.00

CLEVELAND

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	24.00-25.00
No. 1 factory bundles	40.00-41.00
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
No. 1 busheling	33.00-34.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	35.00-36.00
Cut structurals, plate 2 ft and under	43.00-44.00
Low phos. punchings & plate	34.00-35.00
Alloy free, short shovel turnings	17.00-18.00
Electric furnace bundles	34.00-35.00

Cast Iron Grades

No. 1 cupola	49.00-50.00†
Charging box cast	33.00-34.00†
Heavy breakable cast	35.00-36.00†
Stove plate	44.00-45.00†
Unstripped motor blocks	37.00-38.00
Brake shoes	35.00-36.00†
Clean auto cast	52.00-53.00†
Burnt cast	42.00-43.00†
Drop broken machinery	54.00-55.00

Railroad Scrap

R.R. malleable	52.00-53.00
Rails, 2 ft and under	56.00-57.00
Rails, 18 in. and under	57.00-58.00
Rails, random lengths	49.00-50.00
Cast steel	42.00-43.00
No. 1 railroad cast	52.00-53.00
Railroad specialties	45.00-46.00
Angles, splice bars	45.00-46.00
Rails, rerolling	60.00-61.00

Stainless Steel (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	205.00-210.00†
18-8 turnings	105.00-110.00†
430 clips, bundles, solids	110.00-115.00†
430 turnings	35.00-45.00†

YOUNGSTOWN

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	27.00-28.00†
No. 1 busheling	36.00-37.00
No. 1 bundles	36.00-37.00
No. 2 bundles	23.00-24.00
Machine shop turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	37.00-38.00
Electric furnace bundles	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	27.00-28.00
No. 1 bundles	31.00-32.00
No. 2 bundles	23.00-24.00
No. 1 busheling	31.00-32.00
Shovel turnings	21.00-22.00
Machine shop turnings	17.00-18.00
Cast iron borings	19.00-20.00
Low phos. structurals and plate, 2 ft and under	41.00-42.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.00-48.00
No. 1 machinery	49.00-50.00

Railroad Scrap

Rails, random lengths	44.00-45.00
Rails, 3 ft and under	50.00-51.00
Railroad specialties	41.00-42.00

CINCINNATI

(Broker's buying prices; f.o.b. shipping point)

No. 1 heavy melting	31.50-32.50
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.50-32.50
No. 2 bundles	21.00-22.00
No. 1 busheling	31.50-32.50
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Shovel turnings	18.00-19.00
Cast iron borings	18.00-19.00
Low phos. 18 in.	44.00-45.00

Cast Iron Grades

No. 1 cupola	*43.00-44.00*
Heavy breakable cast	37.00-38.00
Charging box cast	39.00-40.00
Drop broken machinery	*54.00-55.00*

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
Rails, 18 in. and under	*55.00-56.00*
Rails, random lengths	*48.00-49.00*

PHILADELPHIA

No. 1 heavy melting	36.00
No. 2 heavy melting	32.00
No. 1 bundles	38.00
No. 2 bundles	23.00
No. 1 busheling	38.00
Electric furnace bundles	*39.00*
Mixed borings, turnings	21.00†
Shovel turnings	24.00-25.00†
Machine shop turnings	21.00†
Heavy turnings	29.00-30.00†
Structurals & plates	*39.00-40.00*
Couplers, springs, wheels	*45.00*
Rail crops, 2 ft & under	*60.00-62.00*

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	*43.00*
Drop broken machinery	*51.00-52.00*
Malleable	63.00†

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	21.00-22.00
No. 1 bundles	31.00-32.00
No. 2 bundles	16.00-17.00
Machine shop turnings	8.00-9.00†
Mixed borings, turnings	9.00-10.00
Shovel turnings	13.00-14.00†
Low phos. structurals & plates	38.00-39.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	*34.00-35.00*

Stainless Steel

18-8 sheets, clips, solids	200.00-205.00
18-8 borings, turnings	90.00-95.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	*80.00-85.00*

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*27.00-28.00*
No. 2 heavy melting	23.00-24.00
No. 1 bundles	*27.00-28.00*
No. 1 busheling	*27.00-28.00*
Machine shop turnings	*6.00-7.00*
Shovel turnings	*11.00-12.00*
No. 1 cast	39.00-40.00
Mixed cupola cast	*33.00-34.00*
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. - heavy melting	31.00-32.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.00-32.00
No. 2 bundles	21.00-22.00
No. 1 busheling	37.00-38.00
Cast iron borings	12.00-13.00
Machine shop turnings	21.00-22.00
Shovel turnings	22.00-23.00
Bar crops and plate	41.00-42.00
Structurals & plate	40.00-41.00
Electric furnace bundles	37.00-38.00
Electric furnace:	
3 ft and under	36.00-37.00
2 ft and under	35.00-36.00

Cast Iron Grades

No. 1 cupola	49.00-50.00
Stove plate	49.00-50.00
Charging box cast	29.00-30.00
Unstripped motor blocks	38.00-39.00
No. 1 wheels	*39.00-40.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*33.00-34.00*
Rails, 18 in. and under	*51.00-52.00*
Rails, rerolling	*51.00-52.00*
Rails, random lengths	*46.00-47.00*
Angles, splice bars	44.00-45.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	*34.00*
No. 2 heavy melting	*32.00*
No. 1 bundles	*36.00*
No. 2 bundles	*22.00*
No. 1 busheling	*36.00*
Machine shop turnings	*15.50*
Shovel turnings	*17.50*

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	41.00†
Heavy breakable cast	41.00†
Unstripped motor blocks	41.00†
Clean auto cast	51.00
Stove plate	*42.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*38.00*
Rails, 18 in. and under	50.00
Rails, random lengths	45.00
Rails, rerolling	*56.00†*
Angles, splice bars	48.00†

HOUSTON

(Brokers' buying prices; f.o.b. cars)

No. 1 heavy melting	*34.00*
No. 2 heavy melting	*31.00*
No. 2 bundles	*19.00*
Machine shop turnings	15.00-16.00
Shovel turnings	19.00-20.00
Low phos. plate & structurals	41.00-42.00†

Cast Iron Grades

No. 1 cupola	39.00-40.00†
Heavy breakable	29.00†
Foundry malleable	36.00-37.00†
Unstripped motor blocks	33.00-33.50†

Railroad Scrap

No. 1 R.R. heavy melt.	*34.00†*

LOS ANGELES

(Brokers' buying prices)

No. 1 heavy melting	*34.00*
No. 2 heavy melting	*31.00*
No. 1 bundles	*33.00*
No. 2 bundles	*17.00-18.00*
Machine shop turnings	16.00
Shovel turnings	15.00
Cast iron borings	15.00
Cut structurals and plate 1 ft and under	45.00

Cast Iron Grades

No. 1 cupola	*44.00-45.00*

Railroad Scrap

No. 1 R.R. heavy melt.	39.00

PORTLAND, OREG.

No. 1 heavy melting	37.00
No. 2 heavy melting	34.00
No. 1 bundles	34.00
No. 2 bundles	27.00
Shovel turnings	22.00
Electric furnace bundles	44.00-45.00

Cast Iron Grades

No. 1 cupola	36.00
Heavy breakable	35.00
Unstripped motor blocks	30.00
Stove plate	24.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	36.00
No. 2 heavy melting	34.00
No. 1 bundles	27.00
No. 2 bundles	20.00-22.00
Machine shop turnings	17.00†
Mixed borings, turnings	17.00†
Electric furnace No. 1	45.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable cast	30.00
Unstripped motor blocks	25.00
Stove plate (f.o.b. plant)	21.00†

SAN FRANCISCO

No. 1 heavy melting	35.00
No. 2 heavy melting	31.00
No. 1 bundles	31.00
No. 2 bundles	20.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

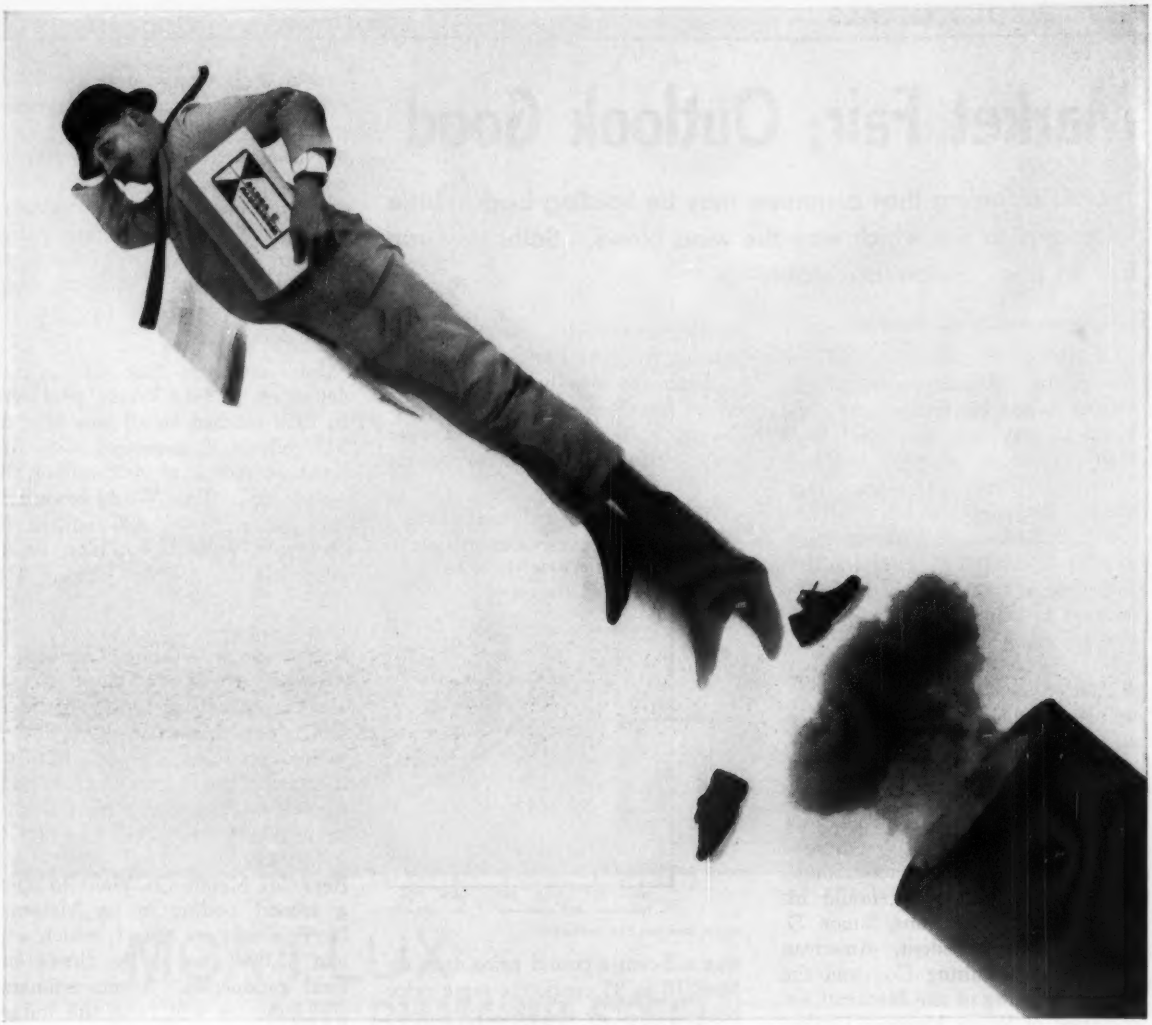
(Brokers' buying prices)

No. 1 heavy melting	32.25
No. 2 heavy melting	28.25
No. 1 bundles	32.25
No. 2 bundles	24.00
Mixed steel scrap	24.25
Mixed borings, turnings	13.00
Busheling, new factory:	
Prepared	32.25
Unprepared	26.25
Shovel turnings	17.00

Cast Iron Grades‡

No. 1 machinery cast	46.50-48.00

†Nominal.
‡F.o.b. Hamilton, Ont.



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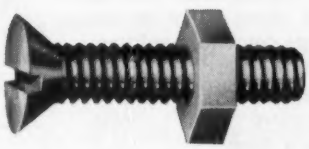

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ALCOA ALUMINUM

ALWAYS FASTEN ALUMINUM WITH ALCOA ALUMINUM FASTENERS

Market Fair; Outlook Good

There's a feeling that customers may be holding back a little on orders to see which way the wind blows. Sales now run fair to fine. Prices are stable

Nonferrous Metal Prices, Pages 232 & 233

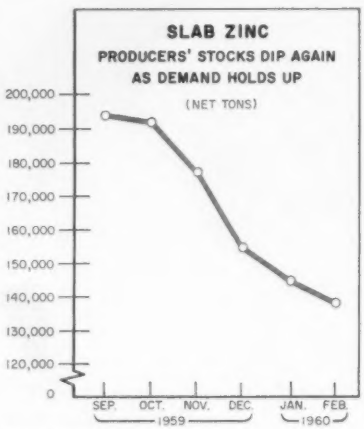
VETERAN metalmen say the change in the complexion of the market is one big reason why 1960 business may not be running as high as some people predicted. They're talking about the trend among customers to let producers carry inventories. Consumers know metal supplies are plentiful and that they can get fast delivery. So they're content to wait out the market before plunking down their cash.

• **Zinc Slow**—Zinc is a good example. Sellers say they're experiencing a "good steady market" but nothing like the heavy buying of January. Shipments are still good, but new orders are a little slow. Outlook is for an upturn to start in early April. Prices look stable. Consumption this year should hit around 1.2 million tons, Simon D. Strauss, vice president, American Smelting & Refining Co., told the annual meeting of the National Association of Waste Material Dealers last week.

• **Lead Quiet** — The lead market bounces around from week to week, but like zinc, nothing much exciting has happened since early in the year. Forecasts point to a substantial pickup in the next few weeks. Prices are steady now, but if the anticipated pickup doesn't come, you could see a drop.

• **Copper Producers Happy** — The status of the copper market depends on whether you talk to a producer or fabricator. Primary producers report they're selling about as much metal as they're producing. Heavy shipments are booked for April, which will be the first really "normal" month of production since the strikes started last August. But fabricators, particularly the brass mills, make no secret that things are slower than expected. There's evidently considerable watching and waiting by their customers.

While the slow business of fabricators hasn't touched primary producers, it has hurt custom smelter sales. The outward manifestation



Source: American Zinc Institute Inc.

was a 2-cent-a-pound price drop on Mar. 10 to 33 cents, the same price being quoted by the primary people. The custom smelter price could go lower—but probably not for several weeks. It depends how buying goes in the early part of the second quarter.

The long term outlook is bullish. John J. Lennon, vice president, Amco Div., American Metal Climax Inc., predicts that by 1970 Free World copper consumption will be up 50 per cent, or 2 million tons.

• **Nickel Active**—Sales may not be running at the pace they did a few weeks ago, but they're still strong. International Nickel Co. Inc. says deliveries in the early months of 1960 have been "extraordinarily high and at a rate greater than our production."

Inco estimates that total nickel deliveries by Free World producers in 1959 reached an all-time high of 515 million lb compared with the previous record of 489 million lb set in 1957. Free World consumption hit a record 420 million lb compared with 320 million lb in 1958 and the previous high of 415 million lb in 1957.

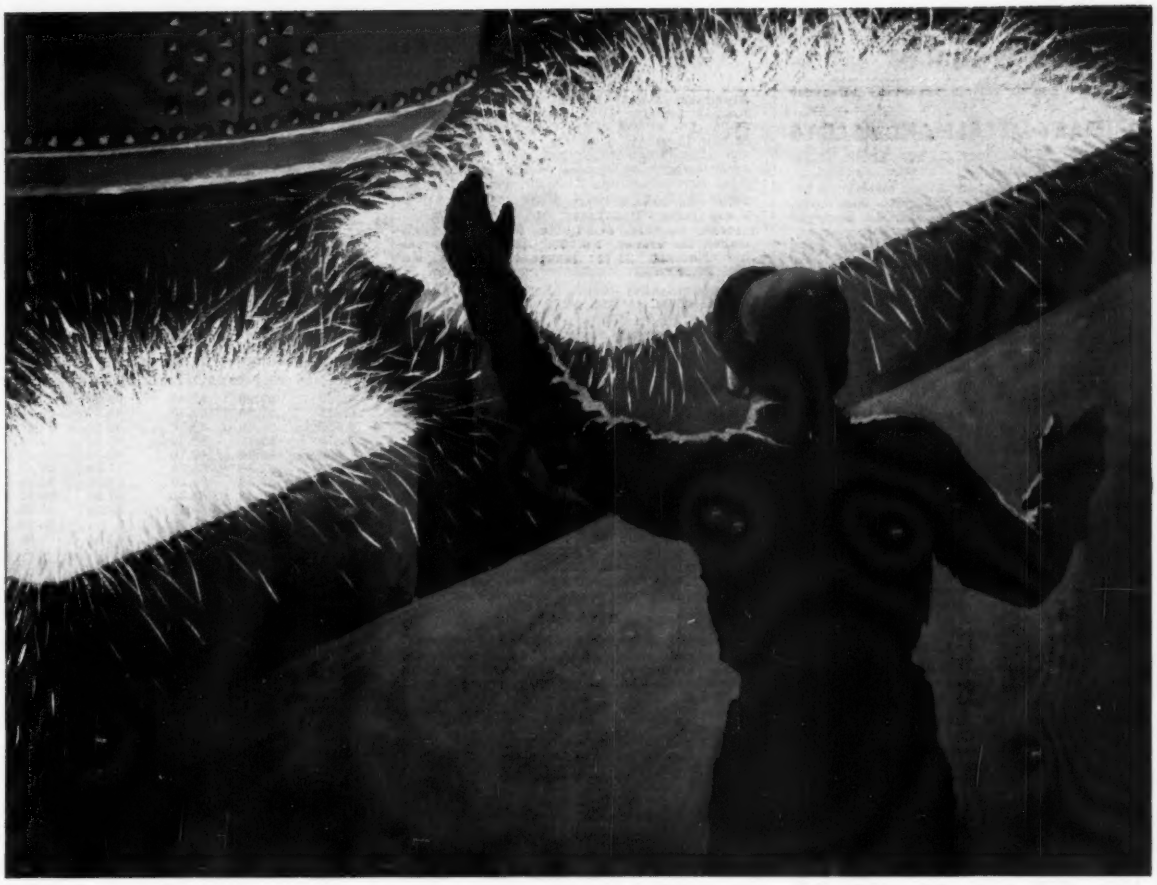
• **Aluminum Output Climbing**—After getting off to a slower start in 1960 than most marketing men forecast, aluminum sales are beginning to pick up steam. One indication: Increased production. Aluminum Co. of America last week brought in a 25,000-ton-a-year line at its Point Comfort, Tex., plant, and Reynolds Metals Co. plans to open a second potline at its Massena, N. Y., works on Apr. 1, which will add 33,000 tons to the firm's annual production. STEEL estimates the increases will raise the industry's output to an annual rate of 2,008,500 tons.

You can look for further increases later in the year. Anaconda Aluminum Co. has already announced it will raise its operating rate from its present 87.5 per cent to 100 per cent of capacity (60,000 tons a year) in the summer.

NONFERROUS PRICE RECORD

	Mar. 16 Price	Last Change	Previous Price	Feb. Avg	Jan. Avg	Mar., 1959 Avg
Aluminum	26.00	Dec. 17, 1959	24.70	26.000	26.000	24.700
Copper	33.00	Mar. 10, 1960	33.00-35.00	34.000	34.000	32.031
Lead	11.80	Dec. 21, 1959	12.30	11.800	11.800	11.238
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	74.000
Tin	100.625	Mar. 16, 1960	100.50	101.170	99.875	103.000
Zinc	13.00	Jan. 8, 1960	12.50	13.000	12.917	11.000

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig 99.8%, Velasco, Tex.



MCA FLUX
AND RIMMING STEEL

Very revealing tests may be made for uniformity of analysis of rimming steels, by comparing top to bottom, rim and core, edge to center, between MCA flux treated and non-treated ingots. Elements most readily segregated—sulphur, carbon, phosphorous and nitrogen—are held in remarkably close limits through the economical use of rare earths.

This allows the use of even larger ingots, with its attendant production economies. For example, rare earth additions to larger rimming ingots of 50,000—60,000—70,000 pounds afford a quality and uniformity formerly obtained only in smaller ingots.

Alert engineers and metallurgists are now studying large rimming ingot products made possible by using our MCA flux. MCA, the leading rare earth producer and processor, has valuable technical information on this subject, and will be happy to share it with you. Write today for specific information.

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Sales Representatives: Brumley-Donaldson Co., Los Angeles, San Francisco
Subsidiary: Cleveland-Tungsten, Inc., Cleveland
Plants: Washington, Pa., York, Pa.

MCA

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 26.00; ingots, 28.10, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.60; No. 43, 25.90; No. 195, 30.70; No. 214, 31.50; No. 356, 26.30, 30 lb ingots; 10 lb ingots, add 0.4 cent per lb; 6 lb ingots, add 0.6 cent per lb.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.00-26.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.50 per lb deld.
Cobalt: 99+%, $1.50 per lb for 500-lb keg, $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.

Copper: Electrolytic, 33.00 deld.; custom smelters, 33.00; lake, 33.00 deld.; fire refined, 32.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $75-80 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis. New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 50 lb, $11 per lb f.o.b. Minneapolis; 50-99 lb, $10; 100-499 lb, $9.50; 500 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $213-215 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-7.0 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom.; sheet, $55 per lb nom.

Tellurium: $3.00 per lb.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot, 100.625; prompt, 100.50.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.50-4.25.

Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb., New York basis, add 0.50. High grade, 14.25; special high grade, 14.50 deld. Diecasting alloy ingot No. 3, 16.50; No. 2, 17.00; No. 5, 16.75 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8 per lb; 100-500 lb, $7 per lb; over 500 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 27.25-28.00; No. 12 foundry alloy (No. 2 grade), 25.00-25.25; 5% silicon alloy, 0.60 Cu max., 25.50-25.75; 13 alloy, 0.60 Cu max., 25.50-26.00; 195 alloy, 27.75-28.75; 108 alloy, 25.25-25.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.50; grade 2, 24.25; grade 3, 23.25; grade 4, 22.75.

Brass Ingot: Red brass, No. 115, 30.75; tin bronze, No. 225, 41.50; No. 245, 36.00; high-leaded tin bronze, No. 305, 35.25; No. 1 yellow, No. 405, 24.75; manganese bronze, No. 421, 29.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.98. Weatherproof, 20,000-lb lots, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $4.00-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	133
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base, f.o.b. customer custody.

Thickness Range (in.)	Widths (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.10-47.70
0.136-0.096	24-72	72-180	45.50-48.70
0.096-0.077	24-72	72-180	46.20-50.00
0.077-0.068	24-72	72-180	46.70-51.70
0.068-0.061	24-72	72-180	46.70-55.50
0.061-0.048	24-72	72-180	47.30-57.30
0.048-0.038	24-72	72-180	47.80-60.20
0.038-0.030	24-72	72-180	48.20-65.30
0.030-0.024	24-60	72-180	48.70-56.60
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-36	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	44.60	49.40
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base, 12 ft lengths.

Diam. (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	72.90	75.80	....	....
0.188	....	....	....	78.20
0.250	58.00	61.60	70.70	72.30
0.375	57.20	62.40	69.00	70.50
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	57.20	62.40	69.00	70.50
0.625	57.20	62.40	65.80	66.60
0.750	55.70	60.70	59.60	62.60
0.875	55.70	60.70	59.60	62.60
1.000	55.70	60.70	59.60	62.60
1.125	53.30	58.30	57.50	60.40
1.250	53.30	58.30	57.50	60.40
1.375	53.30	58.30	57.50	60.40
1.500	53.30	58.30	57.50	60.40
1.625	51.00	55.60	....	58.20
1.750	51.00	55.60	56.30	58.20
1.875	51.00	55.60	....	58.20
2.000	51.00	55.60	56.30	58.20
2.250	49.50	54.00	....	58.20
2.500	49.50	54.00	....	58.20
2.750	47.90	52.20	....	58.20
3.000	47.90	52.20	....	58.20
3.250	....	52.20	....	....
3.375	....	52.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.20-56.90; 6061, 43.20-56.90; 7075, 61.50-71.20; 7079, 66.50-76.20.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 31.55; 1¼ in., 42.75; 1½ in., 51.05; 2 in., 61.70; 3 in., 123.40; 4 in., 169.55; 5 in., 229.60; 6 in., 304.60; 8 in., 458.40; 10 in., 706.45 (3-24 ft lengths).

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	44.70-46.20	53.20-59.00
15-17	44.70-46.20	55.60-60.80
18-23	45.20-46.80	57.70-66.40
24-32	45.20-46.80	65.60-78.80
33-38	48.80-51.40	82.30-93.40
39-44	58.70-62.40	99.90-121.00

MAGNESIUM

Sheets and Plate: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.10; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.25-23.50; No. 2 heavy copper and wire, 20.50-20.75; light copper, 18.00-18.25; No. 1 composition red brass, 16.00-16.50; No. 1 com-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 33.00c)		
	Sheets, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	57.13b	54.86c	....	58.32	29.000	29.000	28.250
Yellow Brass	50.57	36.06d	50.86	54.23	22.250	21.250	20.250
Low Brass, 80%	53.53	53.22	53.82	57.09	24.750	24.500	24.000
Red Brass, 85%	54.58	54.27	54.87	58.14	25.750	25.500	25.000
Com. Bronze, 90%	56.17	55.86	56.46	59.48	26.750	26.500	26.000
Manganese Bronze	58.86	52.21	62.69	....	20.875	20.625	19.875
Muntz Metal	53.20	48.26	....	....	20.875	20.625	20.125
Naval Brass	55.12	48.68	61.43	58.78	20.750	20.500	20.000
Silicon Bronze	62.86	61.80	62.15	80.79	28.375	28.125	27.375
Nickel Silver, 10%	65.98	68.06	68.06	....	26.875	26.625	14.937
Phos. Bronze	77.44	78.19	77.69	79.37	29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 15.00-15.50; new brass clippings, 14.50-15.00; light brass, 10.50-11.00; heavy yellow brass, 11.50-12.00; new brass rod ends, 12.00-12.25; auto radiators, unsweated, 12.50-13.00; cocks and faucets, 13.00-13.50; brass pipe, 13.00-13.50.

Lead: Soft scrap lead, 8.00-8.25; battery plates, 3.00-3.25; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.00-9.50.

Monel: Clippings, 28.00-29.00; old sheets, 24.00-26.00; turnings, 20.00-22.00; rods, 28.00-29.00.

Nickel: Sheets and clips, 53.00-54.00; rolled anodes, 53.00-54.00; turnings, 41.00-42.00; rod ends, 53.00-54.00.

Zinc: Old zinc, 4.00-4.50; new diecast scrap, 4.00-4.50; old diecast scrap, 2.25-2.75.

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 15.00-15.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 12.50-13.00; clean borings and turnings, 9.00-9.50; segregated low copper clips, 16.50-17.00; segregated high copper clips, 15.50-16.00; mixed low copper clips, 15.50-16.00; mixed high copper clips, 15.00-15.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.75-12.00; clean borings and turnings, 10.50-11.00; segregated low copper clips, 15.50-16.00; segregated high copper clips, 14.50-15.00; mixed low copper clips, 15.00-15.50; mixed high copper clips, 14.00-14.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivery refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 24.25; light copper, 22.00; refinery brass (60% copper) dry copper content, 21.50-21.75.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 24.25; light copper, 22.00; No. 1 composition borings, 20.50; No. 1 composition solids, 21.00; heavy yellow brass solids, 15.25; yellow brass turnings, 14.25; radiators, 16.25.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.50.

Copper: Flat-rolled, 50.04; oval, 48.00; 5000-10,000 lb; electrodeposited, 42.00; 2000-5000 lb lots; cast, 44.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 119.50; 200-499 lb, 118.00; 500-999 lb, 117.50; 1000 lb or more, 117.00.

Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.40 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,900 lb, 61.90.

Copper Sulphate: 100-1900 lb, 16.00; 2000-5900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 79.10; 100-600 lb, 69.70; 700-1900 lb, 67.00; 2000-9900 lb, 65.10; 10,000 lb or more, 63.30.

Stannous Chloride (Anhydrous): 25 lb, 154.40; 100 lb, 149.50; 400 lb, 147.10; 800-19,900 lb, 106.20; 20,000 lb or more, 100.10.

Stannous Sulphate: Less than 50 lb, 139.60; 50 lb, 109.60; 100-1900 lb, 107.60; 2000 lb or more, 105.60.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(Concluded from Page 227)

from the market until prices improve.

• **Cincinnati**—Some grades continue to drift to lower levels. No. 1 cupola is off $1 at $43-$44, 18 in. and under rails are off $3 at $55-$56.

• **St. Louis** — Most open hearth grades are off another $1 a ton. No. 2 bundles are down $2, and so is railroad scrap, including No. 1 heavy melting and rerolling rails.

• **Birmingham**—The market here is at a standstill. Two electric furnaces placed orders at the start of the month, and they were quickly filled.

• **San Francisco**—The market is soft, even at the recently lowered price level. Japanese buying is slowing down.

• **Houston**—Continued absence of mill buying has further deflated district scrap prices. The Lone Star mill slashed its offering prices $7 a ton on new contracts through Apr. 14. The Houston mill, which had effected a $2 decline on March purchases, is now quoting $3 a ton lower.

The recent 63-cargo purchase by the Japanese scrap group may bring a further revival in the Gulf area during the April-June period.

The Japanese paid $34.80 for No. 1 heavy melting, $31.80 for No. 2 heavy melting, and $19.80 for No. 2 bundles. Exporters also received $3.50 per ton loading costs. The prices apply when the composite price runs under $36.

CLASSIFIED

Help Wanted

METALLURGISTS — MET. ENGINEERS — CHEMICAL ENGINEERS. Present expansion program in both research and production provides openings for above individuals with experience in one or more of the following: electric furnace operation—either open or submerged arc; smelting, melting and refining operations in either ferroalloys or steel. Excellent opportunities for professional growth and advancement. Generous benefits. Salaries open. All replies held in strictest confidence. Send complete resume to: Mr. R. T. Howard, Technical Director, Chromium Mining and Smelting Corporation, 13550 So. Indiana Ave., Chicago 27, Ill.

CHIEF ENGINEER—Graduate engineer preferred, or other with comparable experience and background will be considered, to supervise engineering department engaged in all phases of design, manufacture, plant layout of foundry equipment, and installation of complete foundry automated molding lines of foundry equipment. Experience and proven background in machine design and foundry operation essential. Send complete resume to Box 827, STEEL, Penton Bldg., Cleveland 13, Ohio.

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DALLAS

We are seeking a top-notch man with either, or preferably both, of the following backgrounds:
Successful field experience in Texas with wholesale building material firms or reinforcing bar fabricators.
Successful sales experience in reinforcing mesh, wire, wire products.
As a young and growing manufacturing company we can offer the right man an excellent opportunity for growth with us. Our own people are aware of this advertisement. Please send confidential resumes to **Box 840, STEEL, Penton Bldg., Cleveland 13, Ohio.**

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Users everywhere agree that their best way to clean iron and steel parts is to tank-soak them in a hot solution of heavy-duty Oakite 24. This hard-working alkaline cleaner gets under the dirt layers and literally tears the soil from the surface. Despite excessive soil contamination of solution Oakite 24 maintains proper pH level and provides long, effective cleaning action.

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Place an advertisement in the "Help Wanted" columns of STEEL's classified pages. Your advertisement will reach the qualified men you need, because STEEL is addressed to highly-trained men in all phases of metalworking

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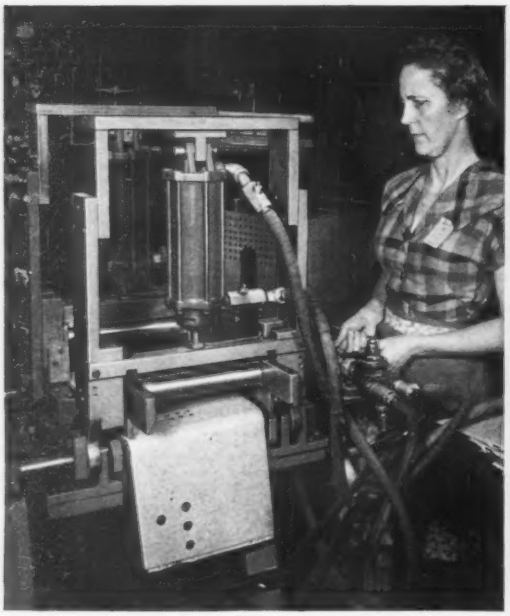


Finishing operations not needed for cabinets made of Clad-Rex® Vinyl-Clad Metal

■ Out of the dies directly into assembly is the procedure in making finished television cabinets at Trav-Ler Radio Corporation, Chicago.

The reason—Clad-Rex vinyl-clad metals are *already* finished. Styling with color, texture and print is almost unlimited. No special tooling or complex production technique is required. The unusual abrasion resistance of Clad-Rex even affects the reject rate common to the relatively delicate coatings needed to finish bare metals.

See for yourself how *all* the other unusual advantages of Clad-Rex vinyl-clad metals can improve both your product and production operations. Write or call today. No obligation, of course.

VINYL-METAL LAMINATES BY **CLAD-REX**® DIVISION OF SIMONIZ COMPANY

2105 Indiana Avenue • Chicago 16, Illinois

Telephone: VIctory 2-7272

10-B

J&L gets new production versatility with two rugged Wean Shearing Lines

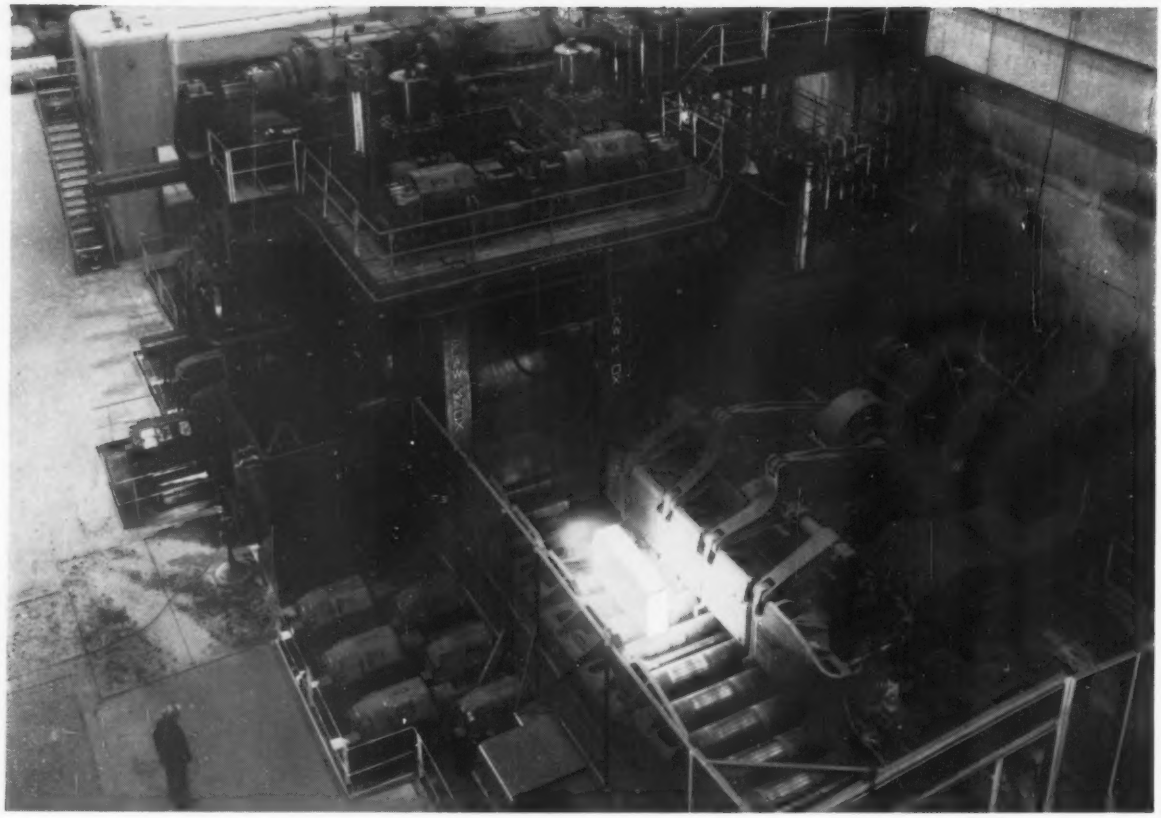
Jones & Laughlin Steel Corporation's Cleveland Works Division has added these modern Wean shearing lines to satisfy an increasingly wide range of customer requirements. Both lines can handle 30,000# coils up to 75" wide. The Upcut Shear Line (left) can side-trim and shear strip up to ⅜" thick, with cut-lengths varying from 48" to 500", at a maximum speed of 140 fpm.

The combination Flying Shear Line (right) shears strip up to ¼" in thickness, with maximum cut lengths of 288", at speeds up to 350 fpm. This high-speed Wean line also permits combinations of side-trimming, slitting, temper passing and shearing or recoiling operations.

If you are planning expansion or modernization of your hot rolled strip shearing facilities, a Wean representative will welcome the opportunity to discuss your requirements. Wean's *creative engineering* can mean new profits for you.

WEAN

THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO



Time, power, maintenance saved on Blaw-Knox two-high slabbing mill

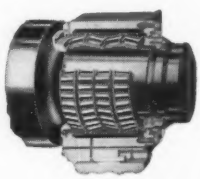
BLAW-KNOX wanted to be sure this new 46″ x 90″ 2-high slabbing mill would work steadily, economically, under tremendous shock loads. They mounted roll necks, screwdowns, edger, edger drives, table drives and table line shaft on Timken® tapered roller bearings.

Result: *Less downtime* in roll changes; the Timken bearings and roll assembly can be removed easily as a unit; *low starting resistance* and less power required because Timken bearings practically eliminate friction; *reduced maintenance* on screwdown and breaker block, because Timken bearings hold the upper roll in place, eliminating the "jump" when slab or bloom enters the mill.

More than 1,000 mill installations the world over use Timken roll neck bearings, 1) *To roll the load*—virtually eliminate friction. Timken bearings have tapered design to take both radial and thrust loads. 2) *Minimize maintenance:* Modern Timken roll neck bearings are designed to provide the best combination of bearing capacity, rigidity and roll neck strength for a given mill roll diameter. Bearings and roll necks stand up longer under load. Grease or oil mist lubrication provides further economies. And, 3) *give longer bearing life.* Mill records show that service life of Timken back-up roll bearings has been obtained in excess of 12,000,000 tons of steel rolled. The full-line contact between rollers and races gives them extra load-carrying capacity.

For the best bearing performance and engineering service when you build or buy a mill, specify Timken tapered roller bearings. They make any machine better. ***When you buy Timken bearings you get...*** *1) Quality you can take for granted. 2) Service you can't get anywhere else. 3) The best-known name in bearings. 4) The pace setter in lower bearing costs.* The Timken Roller Bearing Company, Canton 6, Ohio. *Makers of Tapered Roller Bearings, Fine Alloy Steels and Removable Rock Bits.* Canadian plant: St. Thomas, Ontario, Cable address: "TIMROSCO".

BETTER-NESS rolls on

TIMKEN®

tapered roller bearings